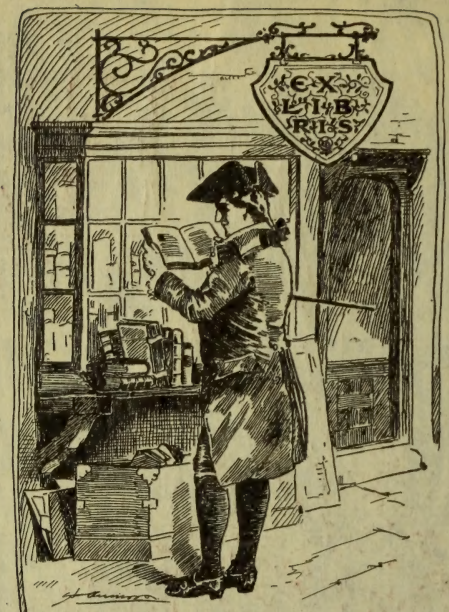

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VOLUME XVIII.

EIGHTEENTH SESSION,

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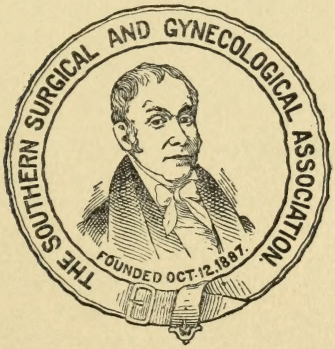
DECEMBER 12, 13 AND 14, 1905.

EDITED BY W. D. HAGGARD, M.D.



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1892.	*J. McFadden Gaston.	*Cornelius Kollock. George Ben Johnston.	*W. E. B. Davis.	Hardin P. Cochrane.
1893.	*Bedford Brown.	Joseph Price. George A. Baxter.	*W. E. B. Davis.	Hardin P. Cochrane.
1894.	*Cornelius Kollock.	A. B. Miles. J. B. S. Holmes.	*W. E. B. Davis.	Hardin P. Cochrane
1895.	Louis McLane Tiffany.	Ernest S. Lewis. Manning Simons.	*W. E. B. Davis.	Richard Douglas.
1896.	Ernest S. Lewis.	Joseph Taber Johnson. Richard Douglas.	*W. E. B. Davis.	A. M. Cartledge.
1897.	George Ben Johnston.	W. E. Parker. Floyd W. McRae.	*W. E. B. Davis.	A. M. Cartledge.
1898.	Richard Douglas.	*H. H. Mudd. James A. Goggans.	*W. E. B. Davis.	A. M. Cartledge.
1899.	Joseph Taber Johnson.	F. W. Parham. W. L. Robinson.	*W. E. B. Davis.	A. M. Cartledge.
1900.	A. M. Cartledge.	Manning Simons. W. P. Nicolson.	*W. E. B. Davis.	W. D. Haggard.
1901.	Manning Simons.	George H. Noble. L. C. Bosher.	W. D. Haggard.	Floyd W. McRae.
1902.	*W. E. B. Davis.	J. Wesley Bovée. J. W. Long.	W. D. Haggard.	Floyd W. McRae.
1903.	J. Wesley Bovée.	Christopher Tompkins. Bacon Saunders.	W. D. Haggard.	Floyd W. McRae.
1904.	Floyd W. McRae.	George S. Brown. J. Shelton Horsley.	W. D. Haggard.	Charles M. Rosser.
1905.	Lewis C. Bosher.	J. D. S. Davis. I. S. Stone.	W. D. Haggard.	Charles M. Rosser
1906.	George H. Noble.	Stuart McGuire. E. Denegre Martin.	W. D. Haggard.	Charles M. Rosser.

* Deceased.

HONORARY MEMBERS.

1894.—Foy, George,	Dublin.
1894.—Jacobs, Charles,	Brussels.
1894.—Martin, A.,	Berlin.
1902.—Maury, Richard B.,	Memphis, Tenn.
1894.—Morisani, O.,	Naples.
1894.—Pozzi, S.,	Paris.
1902.—Reamy, Thaddeus A.,	Cincinnati, Ohio.

MEMBERS.

* Deceased.

1905.—Baker, James Norment, M.D. Visiting Surgeon, St. Margaret's Hospital; Secretary of the Medical Association of the State of Alabama. 719 Madison Avenue, Montgomery, Ala.

1900.—Baldy, John Montgomery, M.D. Professor of Gynecology, Philadelphia Polyclinic; Surgeon to Gynecean Hospital; Gynecologist to Pennsylvania Hospital; Consulting Surgeon to Frederick Douglass Free Hospital. 2219 De Lancey Place, Philadelphia, Pa.

1903.—Balloch, Edward A., M.D. Professor of Surgery, Medical Department of Howard University; Surgeon to Freedmen's Hospital; Member American Academy of Medicine. 1013 Fifteenth Street, N. W., Washington, D. C.

1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

1905.—Bartlett, Willard, M.D. 4257 Washington Boulevard, St. Louis, Mo.

1904.—Batchelor, James M., M.D. House Surgeon of Charity Hospital; Associate Professor of Surgery, Tulane University. New Orleans, La.

1901.—Baughman, Greer D., M.D. Lecturer on Hygiene; Demonstrator of Pathology; Demonstrator of Physiology; in charge of Gynecological Dispensary at Medical College of Virginia. 12 North Second Street, Richmond, Va.

*1900.—Black, James Madison, M.D., B.S.

1893.—Bloom, J. D., M.D. Consulting Surgeon, Touro Infirmary; Lecturer on Diseases of Children, Tulane University. New Orleans, La.

1901.—Boldt, Hermann J., M.D. Gynecologist to Post-Graduate Hospital, St. Mark's Hospital, German Polyclinic; Consulting Gynecologist, Beth Israel Hospital; Professor of

Gynecology, Post-Graduate Medical School. 39 East Sixty-first Street, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical Department University of Cincinnati); Member American Association of Obstetricians and Gynecologists; ex-President Cincinnati Academy of Medicine; ex-President Cincinnati Obstetrical Society. 432 West Fourth Street, Cincinnati, O.

1890.—Bosher, Lewis Crenshaw, M.D. Professor of Practice of Surgery and Clinical Surgery in the Medical College of Virginia; Visiting Surgeon to the Memorial Hospital; Member of American Surgical Association; Member of the American Association of Obstetricians and Gynecologists; Member of Association of American Anatomists; Member of American Urological Association; ex-President of Richmond Academy of Medicine and Surgery. *Vice-President*, 1901; *President*, 1905. 422 East Franklin Street, Richmond, Va.

1895.—Bovée, J. Wesley, M.D. Fellow of American Gynecological Society; President of Washington Obstetrical and Gynecological Society; ex-President Medical and Surgical Society of the District of Columbia; Honorary Fellow Medical Society of Virginia; Professor of Gynecology of George Washington University, Washington, D. C.; Gynecologist to Providence, Columbia, and George Washington University Hospitals; Consulting Physician to St. Ann's Infant Asylum, and Attending Gynecologist to St. Elizabeth's Hospital for the Insane, Washington. D. C. *Vice-President*, 1902; *President*, 1903. The Rochambeau, Washington, D. C.

1889.—Brokaw, Augustus V. L., M.D. Professor of Operative and Clinical Surgery, St. Louis University; Surgeon-in-Chief, St. John's Hospital. 536 N. Taylor Ave., St. Louis, Mo.

1902.—Broome, G. Wiley, M.D. Consulting Surgeon St. Louis City and Female Hospitals; Member St. Louis Medical Society. 612 N. Taylor Avenue, St. Louis, Mo.

1898.—Brown, George S., M.D. Ex-President Jefferson County Medical Society. *Vice-President*, 1904. Birmingham, Ala.

1905.—Brown, John Young, M.D. Surgeon-in-Charge, St. Louis City Hospital; President of the American Association of Obstetricians and Gynecologists. City Hospital, St. Louis, Mo.

1905.—Bullitt, James B., M.D. Secretary Kentucky State Medical Society. 205 West Broadway, Louisville, Ky.

1899.—Burthe, L., M.D. 124 Baronne Street, New Orleans, La.

1900.—Byford, Henry T., M.D. Professor of Gynecology, College of Physicians and Surgeons (University of Illinois), Chicago; Professor of Clinical Gynecology, Northwestern University Woman's Medical School; Professor of Gynecology, Chicago Post-Graduate Medical School; Professor of Gynecology, Chicago Clinical School; Surgeon to Woman's Hospital; Gynecologist to Chicago West Side Hospital. Reliance Building, 100 State Street, Chicago, Ill.

1902.—Caldwell. C. E., M.D. Professor of Orthopedic Surgery, Miami Medical College; Visiting Orthopedic Surgeon, Cincinnati Hospital; Member Cincinnati Academy of Medicine. 1110 Cross Lane, Cincinnati, O.

1904.—Carothers, Robert, M.D. Professor of Clinical Surgery, Medical College of Ohio, Medical Department, Cincinnati University; Surgeon to the Good Samaritan Hospital. 413 Broadway, Cincinnati, O.

1903.—Carr, William P., M.D. Professor of Physiology and Professor of Clinical Surgery, Columbian University; Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Government Hospital for the Insane, Washington, D. C. 1418 L Street, N. W., Washington, D. C.

1891.—Cartledge, Abiah Morgan, M.D. Professor of Gynecology and Abdominal Surgery, Louisville Medical College; Visiting Surgeon to the Louisville City Hospital; Surgeon to the Louisville Home of the Friendless; ex-President of the Louisville Medico-Chirurgical Society. *Treasurer*, 1896–1899; *President*, 1900. 205 West Broadway, Louisville, Ky.

1899.—Cathcart, R. S., M.D. Assistant to Chair of Clinical Surgery in the Medical College of the State of South Carolina. 66 Hasell Street, Charleston, S. C.

1904.—Chambers, P. F., M.D. Attending Surgeon, Woman's Hospital; Consulting Surgeon, French Hospital. 49 West Fifty-seventh Street, New York, N. Y.

1893.—Cocram, Henry S., M.D. 124 Baronne Street, New Orleans, La.

1893.—Coley, Andrew Jackson, M.D. Councillor of the Medical Association of State of Alabama. Alexander City, Ala.

1902.—Coley, William B., M.D. Clinical Lecturer on Surgery, College of Physicians and Surgeons; Assistant Surgeon in Hospital for Ruptured and Crippled; Attending Surgeon to General Memorial Hospital; Fellow of the American Surgical Association, New York Surgical Society, and New York Academy of Medicine. 5 Park Avenue, New York, N. Y.

1904.—Craig, Daniel H., M.D. Surgeon to Out-patients, Free Hospital for Women; Instructor, Boston Polyclinic. 386 Commonwealth Avenue, Boston, Mass.

1902.—Crile, George W., M.D. Professor of Clinical Surgery, Medical College of Western Reserve University; Surgeon to St. Alexis' Hospital; Surgeon to Lakeside Hospital. 275 Prospect Street, Cleveland, O.

1893.—Crofford, T. J., M.D. Professor of Physiology and Clinical Lecturer on Gynecology in the Memphis Hospital Medical College. 155 Third Street, Memphis, Tenn.

Founder.—Cunningham, Russell M., M.D. Professor of Practice of Medicine and Clinical Medicine, Birmingham Medical College; Surgeon to the Pratt Mines Hospital. Ensley, Ala.

1894.—Dandridge, Nathaniel Pendleton, M.D. Professor of Surgery, Miami Medical College; Surgeon to Cincinnati Hospital and Episcopal Hospital for Children; ex-President American Surgical Society. 422 Broadway, Cincinnati, O.

Founder.—Davis, John D. S., M.D. Professor of Surgery, Birmingham Medical College; Surgeon to Hillman Hospital; ex-President of the Jefferson County Medical Society and of the Board of Health of Jefferson County. *Vice-President,* 1905. Avenue G and Twenty-first Street, Birmingham, Ala.

1891.—Dean, G. R., M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of South Carolina State Medical Association; ex-President Association of Surgeons of Southern Railroad. Spartanburg, S. C.

1900.—Deaver, John B., M.D. Surgeon-in-Chief to the German Hospital. 1634 Walnut Street, Philadelphia.

1892.—Dixon, Archibald, M.D. Ex-President of the Kentucky State Medical Society; ex-President of the McDowell

Medical Society; ex-President of the Mississippi Valley Medical Association. Henderson, Ky.

1897.—Dorsett, Walter B., M.D. Professor of Obstetrics and Clinical Gynecology, St. Louis University; Gynecologist to the Missouri Baptist Sanitarium and to Evangelical Deaconess' Hospital. 3941 North Belle Place, St. Louis, Mo.

1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

Founder.—Douglas, Richard, M.D. Formerly Professor of Gynecology and Abdominal Surgery, Vanderbilt University; Fellow of the American Association of Obstetricians and Gynecologists, and of the British Gynecological Society. *Treasurer,* 1895; *Vice-President,* 1896; *President,* 1898. 110 Eighth Avenue, S., Nashville, Tenn.

1903.—Downes, Andrew J., M.D. 1725 Girard Avenue Philadelphia, Pa.

1905.—Dudley, Emelius C., M.D. Professor of Gynecology, Northwestern University Medical School; Surgeon to St. Luke's and Wesley Hospital; Fellow of the American Gynecological Society; Corresponding Member of the Société Obstétricale et Gynecologique de Paris; Fellow of the British Gynecological Society; One of the Founders of the Congrès Périodique, International de Gynécologie et d'Obstetrique; ex-President of the Chicago Gynecological Society. 1617 Indiana Avenue, Chicago, Ill.

*1900.—Dunning, Lehman Herbert, M.D.

1890.—Earnest, James G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting Gynecologist to the Grady Hospital. Atlanta, Ga.

1891.—Elkin, William Simpson, M.D. Professor of Operative and Clinical Surgery, Atlanta College of Physicians and Surgeons; ex-President of the Atlanta Society of Medicine; Surgeon to Grady Hospital. 27 Luckie Street, Atlanta, Ga.

1900.—Ellis, James N., M.D. Surgeon to Grady Hospital; Gynecologist to the Presbyterian Hospital. 1204 Fourth National Bank Building, Atlanta, Ga.

1900.—Ferguson, Alexander Hugh, M.D. Professor of Surgery, Chicago Post-Graduate; Professor of Surgery, Medical Department (College of Physicians and Surgeons), University of Illinois. 10 Drexel Square, Chicago, Ill.

1904.—Finney, J. M. T., M.D. Associate Professor of Surgery, Johns Hopkins University; Surgeon to Out-patients, Johns Hopkins Hospital. 1300 Eutaw Place, Baltimore, Md.

1901.—Fort, Rufus E., M.D. Formerly Superintendent Nashville Hospital. 209 Seventh Avenue, N., Nashville, Tenn.

1895.—Fortier, S. M., M.D. Visiting Surgeon to Charity Hospital. 4422 St. Charles Avenue, New Orleans, La.

1905.—Frank, Louis, M.D. Professor of Abdominal and Pelvic Surgery, Kentucky University Medical Department; Surgeon Louisville City Hospital. 110 West Kentucky Street, Louisville, Ky.

1902.—Freiberg, Albert H., M.D. Professor of Orthopedic Surgery, University of Cincinnati (Medical College of Ohio), and in the Laura Memorial Women's Medical College; Orthopedic Surgeon to the Cincinnati, Presbyterian, and Jewish Hospitals; Fellow of the American Orthopedic Association. 19 West Seventh Street, Cincinnati, O.

1895.—Fry, Henry D., M.D. Professor of Obstetrics, Georgetown University. 1601 Connecticut Avenue, N. W., Washington, D. C.

1903.—Gale, Joseph A., M.D. Surgeon-General Norfolk and Western R. R.; ex-President of Medical Society of Virginia. Roanoke, Va.

1900.—Gaston, J. McF., Jr., A.M., M.D. 421 Capitol Avenue, Atlanta, Ga.

1900.—Gerster, Arpad G., M.D. Attending Surgeon to Mt. Sinai Hospital; Consulting Surgeon to the German Hospital. 34 East Seventy-fifth Street, New York, N. Y.

1902.—Gillespie, Reese B., M.D. Surgeon to Tazewell Sanitarium. Tazewell, Va.

1897.—Glasgow, Frank A., M.D. Professor of Clinical Gynecology of St. Louis Medical College; Gynecologist to St. Louis Mullanphy Hospital; on staff of Martha Parsons Free Hospital; Consulting Surgeon to St. Louis Female Hospital. 3894 Washington Boulevard, St. Louis, Mo.

1903.—Goffe, J. Riddle, M.D. Professor of Gynecology, New York Polyclinic Medical School and Hospital; Gynecol-

ogist, New York City Hospital; Assistant Gynecologist to New York Skin and Cancer Hospital; Consulting Gynecologist, St. Joseph's Hospital, Yonkers, N. Y.; Fellow American Gynecological Society. 29 West Forty-sixth Street, New York, N. Y.

Founder.—Goggans, James A., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; Senior Councillor of the Medical Association of the State of Alabama; Fellow of the British Gynecological Society. *Vice-President*, 1898. Alexander City, Ala.

1900.—Goldsmith, W. S., M.D. 262 Jackson Street, Atlanta, Ga.

Founder.—Graham, Joseph, M.D. Member Charlotte, North Carolina, Medical Society; ex-Member North Carolina State Board of Health, and North Carolina State Board of Medical Examiners; ex-President North Carolina State Medical Society. Charlotte, N. C.

1892.—Grant, Horace H., M.D. Professor of Surgery in the Hospital College of Medicine; Surgeon to the Louisville City Hospital. 321 Equitable Building, Louisville, Ky.

1905.—Guerry, Le Grand, M.D. Surgeon Columbia Hospital. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Gynecologist to St. Vincent Hospital and Dispensary. Norfolk, Va.

1896.—Haggard, William David, M.D. Professor of Gynecology, Medical Department, University of Tennessee; formerly Professor of Gynecology and Abdominal Surgery, University of the South (Sewanee); Surgeon to St. Thomas' Hospital; Gynecologist to Nashville City Hospital; Member Alumni Association of Woman's Hospital, of New York. *Treasurer*, 1900; *Secretary*. 148 Eighth Avenue, N., Nashville, Tenn.

1892.—Hall, Rufus Bartlett, A.M., M.D. Professor of Clinical Gynecology in the Miami Medical College; Gynecologist to the Presbyterian Hospital; ex-President of the Cincinnati Obstetrical Society; ex-President of the American Association of Obstetricians and Gynecologists; Fellow of British Gynecological Society. 628 Elm Street, Cincnnati, O.

1901.—Hazen, Charles M., M.D. Professor of Physiology, Medical College of Virginia. Bon Air (Richmond), Va.

1896.—Heflin, Wyatt, M.D. Ex-President of the Jefferson County Medical Society. Birmingham, Ala.

1905.—Hendon, George A., M.D. Professor of Principles and Practice of Surgery and Surgical Pathology, Hospital College of Medicine. 1826 Baxter Avenue, Louisville, Ky.

Founder.—Herff, Ferdinand, M.D. 308 East Houston Street, San Antonio, Texas.

1889.—Hill, Robert Somerville, M.D. Councillor of the Alabama State Medical Association; formerly Surgeon of Second Regiment Alabama State Troops. Montgomery, Ala.

1902.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Fellow of College of Physicians, Philadelphia; Gynecologist to the Howard, Orthopedic, and Philadelphia Hospitals; Fellow of American Gynecological Society. 1821 Spruce Street, Philadelphia, Pa.

Founder.—Hogan, S. M., M.D. Grand Senior Councillor and ex-Vice-President of the Medical Association of the State of Alabama. Montgomery, Ala.

1900.—Hoke, Michael, M.D., B.E. 268 Peachtree Street, Atlanta, Ga.

1891.—Holmes, J. B. S., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; ex-President of the Georgia Medical Association; Fellow of the American Association of Obstetricians and Gynecologists. *Vice-President*, 1894. Atlanta, Ga.

1900.—Horsley, John Shelton, M.D. Professor of Principles of Surgery, Medical College of Virginia; Surgeon to Memorial Hospital. *Vice-President*, 1904. 303 W. Grace Street, Richmond, Va.

1896.—Hundley, J. Mason, M.D. Associate Professor of Diseases of Women and Children, University of Maryland; President Clinical Society of Baltimore. 1009 Cathedral Street, Baltimore, Md.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University. 1420 Eutaw Place, Baltimore, Md.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital; Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hos-

pital of Newark, N. J.; to All Souls' Hospital, Morristown, N. J., and to Mountain Side Hospital, Montclair, N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1889.—Johnson, Joseph Taber, M.D. Professor of Gynecology and Abdominal Surgery, Georgetown University; formerly Gynecologist to Providence Hospital; Chief of Service of Gynecology and Abdominal Surgery, Georgetown University Hospital, and President of the Board of Administration; President of the Woman's Dispensary, and of the Medical Society of the District of Columbia (1887); Member of the British Medical Association; Fellow of the Gynecological Society; President of the Washington Obstetrical and Gynecological Society; Secretary American Gynecological Society, 1886–1890, and President, 1899. *President,* 1899. 926 Farragut Square, Washington, D. C.

1901.—Johnson, Robert W., M.D. Professor of Surgery, Baltimore Medical College. Corner Franklin and Cathedral Streets, Baltimore, Md.

Founder.—Johnston, George Ben, M.D. Formerly Consulting Surgeon to the Richmond Eye, Ear, and Throat Infirmary; ex-President of the Richmond Academy of Medicine and Surgery; ex-President of the Medical Society of Virginia; Member of the American Association of Obstetricians and Gynecologists, and First Vice-President, 1896; Member of the Ninth International Medical Congress; Member of the American Surgical Association; late Professor of Anatomy in the Medical College of Virginia, and now Professor of the Practice of Surgery and Clinical Surgery; Surgeon to the Old Dominion Hospital; Consulting Surgeon to the City Free Dispensary. *Vice-President,* 1892; *President,* 1897. 407 East Grace Street, Richmond, Va.

1902.—Jordan, William Mudd, M.D. Surgeon to St. Vincent's Hospital; Gynecologist to Hillman Hospital; formerly Assistant Surgeon, U. S. Marine Hospital Service. Birmingham, Ala.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888–89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1888–99;

Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Membre Associé Etrander de la Société Obstétricale et Gynecologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member Washington Academy of Sciences; Fellow American Gynecological Society. 1418 Eutaw Place, Baltimore, Md.

1899.—Kohlman, William, M.D. 3500 Prytania Street, New Orleans, La.

*1889.—Le Grand, John C., M.D.

1894.—Leigh, Southgate, M.D., Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President Medical Society of Virginia, 1899–1900. 147 Granby St., Norfolk.

1893.—Lewis, Ernest S., M.D. Professor of Gynecology, Medical Department of Tulane University. *Vice-President,* 1895; *President,* 1896; *Member of Council,* 1896–1903. 124 Baronne Street, New Orleans, La.

1893.—Lewis, Hampton S., M.D. 124 Baronne Street, New Orleans, La.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon, Post-Graduate Hospital, and to the Babies' Wards. 24 West Fiftieth Street, New York, N. Y.

Founder.—Long, John W., M.D. Emeritus Professor of Gynecology and Pediatrics in the Medical College of Virginia; formerly Gynecologist to the Old Dominion Hospital and the Richmond City Dispensary; Consulting Surgeon to the Watts Hospital, Durham; Member, ex-Orator, and ex-Vice-President of the North Carolina Medical Society. *Vice-President,* 1902. Greensboro, N. C.

1904.—Lupton, Frank A., M.D. 716 North Eighteenth Street, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1895.—McGannon, M. C., M.D. Professor of Gynecology, Medical Department, University of Nashville; Chief Surgeon Woman's Hospital. 301 Eighth Avenue, N., Nashville, Tenn.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. 518 East Grace Street, Richmond, Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1905.—McLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1888.—McMurtry, Lewis S., M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery, Hospital College of Medicine, Louisville; Gynecologist to St. Mary and St. Elizabeth Hospital; Gynecologist to Gray Street Infirmary; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Kentucky State Medical Society; Corresponding Member of the Gynecological Society of Boston; Fellow of the British Gynecological Society; Ordinary Fellow of the Edinburgh Obstetrical Society; Fellow of the American Surgical Society. *President,* 1891; *Member of Council,* 1892–1904. Masonic Temple, Louisville, Ky.

1888.—McRae, Floyd Willcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Treasurer,* 1901–1903; *President,* 1904. Peters Building, Atlanta, Ga.

1900.—MacDonald, Willis G., M.D. Professor of Surgery (Adjunct), Albany Medical College; Surgeon to Albany Hospital; Chief Surgeon of South End Dispensary; Fellow of the American Surgical Society. 29 Eagle Street, Albany, N. Y.

1900.—Manton, Walter Porter, M.D. Professor of Clinical Gynecology and Adjunct Professor of Obstetrics, Detroit College of Medicine; Gynecologist to Harper Hospital, Eastern and Northern Michigan Asylums for the Insane; Consulting Gynecologist to St. Joseph's Retreat; Vice-President of Medical

Board of the Woman's Hospital and Infants' Home. 32 Adams Avenue, Detroit, Mich.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, Edmund Denegre, M.D. Professor of Minor and Clinical Surgery, New Orleans Polyclinic; Visiting Surgeon to the Charity Hospital; Consulting Surgeon to the Eye, Ear, Nose, and Throat Hospital; President Orleans Parish Medical Society; Ex-Vice-President American Medical Association. 115 Chartres Street, New Orleans, La.

1904.—Mason, J. M., M.D. Alternate Surgeon to St. Vincent Hospital. 2010 Thirteenth Avenue, Birmingham, Ala.

1899.—Mastin, William M., M.D. Fellow of the American Surgical Association; Member of the American Association of Genitourinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medica Department of Tulane University; Fellow of the American Surgical Association. 624 Gravier Street, New Orleans, La.

1896.—Matthews, William P., M.D. Professor of Anatomy, Medical College of Virginia; Orthopedic Surgeon to the Old Dominion Hospital. Richmond, Va.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital. Rochester, Minn.

Founder.—Meriwether, Frank T., M.D. Assistant Surgeon, U. S. A. (Retired). Asheville, N. C.

1899.—Michinard, P. E., M.D. 624 Gravier Street, New Orleans, La.

1888.—Miller, C. Jeff., M.D. Professor of Operative Gynecology, New Orleans Polyclinic; Visiting Gynecologist to Charity Hospital. 1719 Jackson Avenue, New Orleans, La.

1899.—Milliken, Samuel E., M.D. 449 Elm Street, Dallas, Texas.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough Street, Boston, Mass.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. Washington, D.C.

1903.—Morgan, James B., M.D. Professor of Anatomy and Clinical Surgery, Medical College of Georgia; Chairman Board of Censors, Georgia Medical Association. 1272 Broad Street, Augusta, Ga.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama; Vice-President of Tri-State Medical Society of Alabama, Georgia, and Tennessee. 716 North Eighteenth Street, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital. 58 West Fifty-sixth Street, New York, N. Y.

1901.—Mullally, Lane, M.D. Professor of Obstetrics and Diseases of Children, Medical College State of South Carolina; Visiting Physician in Obstetrics and Pediatrics, Roper Hospital. Charleston, S. C.

1905.—Munro, John Cummins, M.D. Surgeon-in-Chief, Carney Hospital; Consulting Surgeon, Quincy Hospital and Framingham Hospital; President of the Society of Clinical Surgery; Member American Surgical, American Academy, and of the Association of American Anatomists. 173 Beacon Street, Boston, Mass.

1891.—Murfree, James Brickle, M.D. Professor of Surgery, University of the South (Sewanee); ex-President of the Tennessee State Medical Society, and of the Tri-State Medical Society of Alabama, Georgia, and Tennessee. Murfreesboro, Tenn.

1894.—Murphy, J. B., M.D. Professor of Surgery, Rush Medical College, in affiliation with the University of Chicago; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon to the Presbyterian, Cook County, and Mercy Hospitals. 100 State Street, Chicago, Ill.

Founder.—Nash, Herbert Milton, M.D. Consulting Surgeon to the Retreat for the Sick (Hospital), Norfolk, Consultant to the Staff of St. Vincent's Hospital; ex-President of the Norfolk City Medical Society; Member of the State Board of Medical Examiners of Virginia. 296 Freemason Street, Norfolk, Va.

1899.—Neff, Wallace, M.D. Formerly Adjunct Professor of Clinical Surgery and Surgical Pathology, Medical College of Ohio (University of Cincinnati); late Major and Brigade Surgeon, U. S. V. 1337 K Street, Washington, D. C.

* 1891.—Nelson, Hugh T., M.D.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons. *Vice-President*, 1900. Prudential Building, Atlanta, Ga.

1896.—Noble, Charles P., M.D. Surgeon-in-Chief, Kensington Hospital for Women; Consulting Surgeon, Woman's Hospital; Lecturer on Gynecology, Philadelphia Polyclinic. 1500 Locust Street, Philadelphia, Pa.

1890.—Noble, George H., M.D. Professor of Abdominal Surgery and Clinical Gynecology in the Atlanta School of Medicine; Dean of same; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President*, 1901; *President*, 1905–06. 131 South Pryor Street, Atlanta, Ga.

1903.—Nolen, William L., M.D. Visiting Surgeon, Erlanger Hospital; ex-President Chattanooga Medical Society. Loveman Building, Chattanooga, Tenn.

1890.—Nunn, R. J., M.D. Savannah, Ga.

1902.—O'Brien, Matthew Watson, M.D. Surgeon Southern, and Chesapeake and Ohio Railways; Member of the American Association for the Advancement of Science. 908 Cameron Street, Alexandria, Va.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1903.—Ochsner, Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1904.—Oechsner, John F., M.D. Professor of Orthopedics, New Orleans Polyclinic; Assistant Demonstrator of Anatomy, Tulane University; Visiting Surgeon, Charity Hospital; 124 Baronne Street, New Orleans, La.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1902.—Oviatt, Charles W., M.D. Formerly Professor of Surgery in Milwaukee Medical College; Attending Surgeon St. Mary's Hospital. Oshkosh, Wis.

Founder.—Paine, John Fannin Young, M.D. Professor of Obstetrics and Gynecology in the Medical Department, University of Texas; Gynecologist and Obstetrician, John Sealy Hospital; Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Texas Medical Association; Fellow of the Texas Academy of Science. 2177 Market Street, Galveston, Texas.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899. 1429 Seventh Street, New Orleans, La.

1900.—Park, Roswell, M.D. Professor of Surgery, Medical Department, University of Buffalo; Surgeon, Buffalo General Hospital; Member German Congress of Surgeons, Italian Surgical Society, American Surgical Association, American Orthopedic, and American Genitourinary Associations. 510 Delaware Avenue, Buffalo, N. Y.

1893.—Parker, William E., M.D. Formerly Visiting Surgeon to the Charity Hospital of New Orleans. *Vice-President*, 1897. Dugan-Stuart Building, Hot Springs, Ark.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. 211 Camp Street, New Orleans, La.

1904.—Peters, J. U. W., M.D. Surgeon to St. Vincent Hospital. Birmingham, Ala.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 7 East Thirty-sixth Street, New York.

1900.—Porter, Miles F., M.D. Trustee of American Medical Association. 47 West Wayne Street., Fort Wayne, Ind.

1889.—Potter, William Warren, M.D. Consulting Gynecologist to the Woman's Hospital; Consulting Surgeon to the Buffalo General Hospital; President and Examiner in Obstetrics, New York State Medical Examining and Licensing Board; Chairman of Section of Obstetrics and Diseases of Women, American Medical Association, 1890; President of the Buffalo Obstetrical Society, 1884–1886; President of the Medical Society of the State of New York, 1891; Executive President of the Section of Gynecology and Abdominal Surgery, Pan-American Medical College, 1893. 284 Franklin Street, Buffalo, N. Y.

1889.—Price, Joseph, M.D. Physician-in-Charge of the Obstetrical and Gynecological Department of the Philadelphia Dispensary; Fellow of the American Association of Obstetricians and Gynecologists; ex-Chairman, Section of Diseases of Women and Obstetrics, American Medical Association. *Vice-President*, 1893. 241 North Eighteenth Street, Philadelphia, Pa.

1899.—Quinn, W. A., M.D. Henderson, Ky.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, Medical College of Ohio; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians

and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. Corner Seventh and Race Streets, Cincinnati, Ohio.

1900.—Rees, Charles Mayrant, M.D. Professor of Abdominal Surgery and Gynecology, Charleston Medical School; Abdominal Surgery and Gynecology, City Hospital; Gynecologist to Shirro's Dispensary. Charleston, S. C.

1899.—Richardson, Maurice Howe, M.D. Visiting Surgeon to the Massachusetts General Hospital; Assistant Professor of Clinical Surgery, Harvard Medical School. 224 Beacon Street, Boston, Mass.

1901.—Ricketts, Edwin, M.D. Professor of Abdominal Surgery and Gynecology at the Cincinnati Polyclinic; Member of the American and British Medical Associations; ex-President of the American Association of Obstetricians and Gynecologists. 415 Broadway, Cincinnati, Ohio.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery; Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *Vice-President,* 1889. 1520 Third Street, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Lecturer on Gynecology, Instructor in Gynecology and Abdominal Surgery, Attending Obstetrician, Outside Obstetrical Department, Medical College of Virginia. 17 North Fifth Street, Richmond, Va.

1889.—Robinson, William Lovaille, M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Danville Medical Society; Member of the Medical Examining Board of Virginia; ex-President of Virginia Medical Society. *Vice-President,* 1899. 753 Main Street. Danville, Va.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Ala.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University College of Medicine; Consulting Surgeon, Parkland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical

Association; Vice-President Tri-State Society of Texas, Louisiana and Arkansas. *Treasurer.* 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert A., A.B., M.D. Professor of Gynecology and Dean of the Faculty, Medical Department, University of North Carolina; Gynecologist to Rex Hospital; Surgeon-in-Chief, St. Agnes Hospital. Tucker Building, Raleigh, N. C.

1901.—Runyan, Joseph P., M.D. 203 West Second Street, Little Rock, Ark.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President Texas State Medical Association. *Vice-President,* 1903. Ninth and Houston Streets, Fort Worth, Texas.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Texas.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery, Columbian University. 1328 New York Avenue, N. W., Washington, D. C.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, Kentucky University; Consulting Surgeon to Louisville Hospital. 633 St. Charles Place, Louisville, Ky.

Founder.—Shivers, Offa Lundsford, M.D. Councillor of the Alabama Medical Association. Marion, Ala.

1893.—Simons, Manning, M.D. Professor of Clinical Surgery, Medical College, State of South Carolina; Surgeon to St. Francis Xavier's Infirmary; Surgeon to City Hospital; ex-President Medical Society of South Carolina; President of the South Carolina Medical Association; Member American Association of Obstetricians and Gynecologists; ex-Vice-President Tri-State Medical Society of Virginia and the Carolinas. *Vice-President,* 1895 and 1900; *President,* 1901. 111 Church Street, Charleston, S. C.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist to Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1894.—Smith, Reginald K., M.D. Surgeon U. S. Navy. 2600 Jackson Street, San Francisco, Cal.

1899.—Smythe, Frank Davie, M.D. Surgeon to St. Joseph's Hospital; Assistant Professor of Surgery, Memphis Hospital Medical College; Demonstrator of Operative Surgery; formerly Member of the State Board of Examiners of Mississippi. Porter Building, Memphis, Tenn.

1904.—Stokes, James Ernest, M.D. Salisbury, N. C.

Founder.—Stone, Isaac Scott, M.D. Clinical Professor Gynecology, Georgetown University; Gynecologist to Columbia Hospital, and Associate Gynecologist to Georgetown University Hospital; Member American and British Gynecological Societies; Honorary Fellow of Medical Society of the State of New York; Fellow of the Medical Society of Virginia; Member Washington Academy of Sciences; Washington Obstetrical and Gynecological Society. 1618 Rhode Island Avenue, N.W. Washington, D. C.

1894.—Talley, D. F., M.D. Ex-President of the Jefferson County Medical Society; Professor of Materia Medica and Lecturer on Surgery, Birmingham Medical College. Birmingham, Ala.

1902.—Tate, Magnus, A., M.D. Lecturer on Anatomy of the Female Pelvic Viscera and Embryology, Miami Medical College; Assistant Gynecologist to St. Mary's Hospital; Consulting Obstetrician to Speer's Hospital; Member American Association of Obstetricians and Gynecologists. Third and Broadway, Cincinnati, O.

* *Founder.*—Taylor, Benjamin W., M.D.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—Taylor, William Wood, A.B., M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 246 Randolph Building, Memphis, Tenn.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1891.—Tiffany, Louis McLane, M.D. Professor of Surgery in the University of Maryland; Fellow of the American Surgical Association. *President,* 1895. 831 Park Avenue, Baltimore, Md.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. *Vice-President*, 1903. 116 East Franklin Street, Richmond, Va.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital, etc. 410 North Jefferson Street, St. Louis, Mo.

1905.—Vance, Ap Morgan, M.D. Surgeon to St. Mary and Elizabeth Hospital; Consulting Surgeon, Louisville City Hospital. 921 Fourth Street, Louisville, Ky.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; Fellow of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, N. Y.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President Mississippi Valley Medical Association; President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1905.—Wathen, John R., M.D. Professor of Surgery, Kentucky School of Medicine; Surgeon to St. Anthony's Hospital; Surgeon to Louisville City Hospital and to Kentucky School of Medicine Hospital; President Louisville Clinical Society. 678 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1901.—Werder, X. O., M.D. Gynecologist, Mercy Hospital, Pittsburgh; Professor of Gynecology, West Pennsylvania Medical College; Consulting Surgeon to the South Side Hospital, Allegheny General Hospital, St. Francis' Hospital, etc. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. 241 Equitable Building, Atlanta, Ga.

1904.—Whaley, T. P., M.D. Lecturer Genito-Urinary and Renal Surgery, Charleston Medical School; Lecturer Diseases of Skin, Medical College of the State of South Carolina; Sur-

geon to Sherra's Dispensary; Visiting Surgeon, Charleston City Hospital. 113 Wentworth Street, Charleston, S. C.

1902.—Whitacre, Horace J., M.D., B.S. Professor of Pathology and Surgeon to Clinics, Medical Department, University of Cincinnati; Surgeon to Christ Hospital; Consulting Surgeon to Speer's Hospital; President Cincinnati Research Society; Assistant Pathologist Cincinnati Hospital. 831 Union Trust Building, Cincinnati, O.

1900.—Williams, Howard J., A.B., A.M., M.D. Surgeon to Macon Hospital; ex-President of the Medical Association of Georgia, etc. 550 Orange Street, Macon, Ga.

1900.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Pathologist to Woman's Hospital of Maryland. 845 Park Avenue, Baltimore, Md.

Founder.—Wilson, J. T., M.D. Ex-President of the North Texas Medical Association; President of the Texas Medical Association; Superintendent of the State Hospital for the Insane. *Vice-President*, 1891. Sherman, Texas.

1905.—Winslow, Randolph, M.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to the Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Consulting Surgeon, Rebekah Hospital; Member American Association of Anatomists. 4318 Olive Street, St. Louis, Mo.

1891.—Wyeth, John Allen, M.D. Ex-President of the American Medical Association (1901). Professor of Surgery in the New York Polyclinic; Consulting Surgeon to St. Elizabeth's Hospital; Visiting Surgeon to Mt. Sinai Hospital and Polyclinic Hospital; Honorary member of the Texas State Medical Association; ex-President of the New York State Medical Association; ex-President of the New York Pathological Society. 19 West Thirty-fifth Street, New York, N. Y.

1900.—Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Chief of Clinic, Genito-Urinary Surgery, Johns Hopkins Hospital. 1005 North Charles Street, Baltimore, Md.

1902.—Zinke, E. Gustav, M.D. Professor of Obstetrics in Medical College of Ohio; Obstetrician and Gynecologist German Protestant Hospital; Attending Obstetrician to Ohio Maternity; Fellow of American Association of Obstetricians and Gynecologists. 13 Garfield Place, Cincinnati, O.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

SECTION 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

SEC. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for re-election at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII.

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

Any member who for three consecutive years fails to attend the meetings shall be dropped from the roll of membership.

ARTICLE X.

The membership of the Association shall be limited to two hundred.

ARTICLE XI.

All members who have been in continuous membership for twenty years and have attended fifty per cent. of the meetings shall become life members and be exempt from dues.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the second Tuesday of November at 10 A.M., at such place as may be designated by the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive, at each annual Session, a draft from the President, drawn on the Treasurer, for the sum of $500 for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII.

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV.

No paper read before the Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Council.

ARTICLE XVI.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

EIGHTEENTH ANNUAL MEETING

OF

THE SOUTHERN

SURGICAL AND GYNECOLOGICAL

ASSOCIATION,

HELD AT THE

SEELBACH HOTEL,

Louisville, Kentucky,

DECEMBER 12, 13 AND 14, 1905.

EIGHTEENTH ANNUAL MEETING.

FIRST DAY.—*Tuesday, December* 12, 1905.

The following named members were present:

BONIFIELD, CHARLES LYBRAND....Cincinnati, Ohio.
BOSHER, LEWIS CRENSHAW.....Richmond, Va.
BOVEE, J. WESLEY.....Washington, D. C.
BROWN, GEORGE S.....Birmingham, Ala.
BYFORD, HENRY T.....Chicago, Ill.
CAROTHERS, ROBERT.....Cincinnati, O.
CARR, WILLIAM P.....Washington, D. C.
CARTLEDGE, ABIAH MORGAN.....Louisville, Ky.
CATHCART, R. S.....Charleston, S. C.
COLEY, WILLIAM B.....New York, N. Y.
CRAIG, D. H.....Boston, Mass.
CRILE, GEORGE W.....Cleveland, O.
DAVIS, JOHN D. S. .....Birmingham, Ala.
DOWNES, ANDREW J.....Philadelphia, Pa.
DUNNING, LEHMAN H.....Indianapolis, Ind.
EARNEST, J. G.....Atlanta, Ga.
FORT, RUFUS E.....Nashville, Tenn.
GOLDSMITH, W. S.....Atlanta, Ga.
GRANT, H. H.....Louisville, Ky.
HAGGARD, WILLIAM D.....Nashville, Tenn.
HALL, RUFUS B.....Cincinnati, O.
HAZEN, CHARLES M.....Bon Air (Richmond) Va.
HILL, ROBERT S.....Montgomery, Ala
HOLMES, J. B. S.....Atlanta, Ga.
HORSLEY, JOHN SHELTON.....Richmond, Va.
HUNNER, GUY LE ROY.....Baltimore, Md.
KELLY, HOWARD ATWOOD.....Baltimore, Md.
LONG, JOHN W.....Greensboro, N. C.
MCGUIRE, STUART.....Richmond, Va.

McMURTRY, LEWIS S.....Louisville, Ky.
McRAE, FLOYD WILLCOX.....Atlanta, Ga.
MAYO, CHARLES H. .....Rochester, Minn.
MORRIS, ROBERT TUTTLE.....New York, N. Y.
MURFREE, JAMES BRICKLE.....Murfreesboro, Tenn.
NICOLSON, WILLIAM PERRIN.....Atlanta, Ga.
NOBLE, CHARLES P.....Philadelphia, Pa.
NOBLE, GEO. H.....Atlanta, Ga.
NOLEN, WILLIAM L.....Chattanooga, Tenn.
OCHSNER, EDWARD H.....Chicago, Ill.
OVIATT, CHARLES W.....Oshkosh, Wis.
PARHAM, F. W.....New Orleans, La.
PERKINS, W. M.....New Orleans, La.
POTTER, WILLIAM WARREN.....Buffalo, N. Y.
QUINN, W. A.....Henderson, Ky.
RANSOHOFF, JOSEPH.....Cincinnati, O.
ROBERTS, WILLIAM O.....Louisville, Ky.
ROGERS, MACK.....Birmingham, Ala.
ROSSER, CHAS. M.....Dallas, Tex.
ROYSTER, HUBERT A.....Raleigh, N. C.
SAUNDERS, BACON.....Fort Worth, Tex.
SHERRILL, J. G.....Louisville, Ky.
STOKES, J. E.....Salisbury, N. C.
TALLEY, D. F.....Birmingham, Ala.
TOMPKINS, CHRISTOPHER.....Richmond, Va.
WATKINS, ISAAC L.....Montgomery, Ala.
WHITACRE, HORACE J.....Cincinnati, O.
YOUNG, HUGH H.....Baltimore, Md.

NEW MEMBERS.

BAKER, JAS. N.....Montgomery, Ala.
BARTLETT, WILLARD.....St. Louis, Mo.
BROWN, JOHN YOUNG.....St. Louis, Mo.
BULLITT, JAS. B.....Louisville, Ky.
DUDLEY, E. C.....Chicago, Ill.
FRANK, LOUIS.....Louisville, Ky.
HENDON, GEO. A.....Louisville, Ky.
VANCE, A. M.....Louisville, Ky.
WATHEN, JNO. R.....Louisville, Ky.
WITHERSPOON, T. C.....St. Louis, Mo.

Letters and messages of regret were received from a number of Fellows who were unable to attend the meeting.

Morning Session. The Association met at the Seelbach Hotel, and was called to order by the Chairman of the Committee of Arrangements, Dr. W. O. Roberts, of Louisville, Kentucky, at 9.45 A.M. The customary Address of Welcome and the Response thereto were waived.

After announcements by the Chairman of the Committee of Arrangements of entertainments, luncheons, etc., the President, Dr. Lewis C. Bosher, of Richmond, Virginia, took the Chair, when the reading of papers was proceeded with.

Papers were then read as follows:

1. "Surgical Repair of Nerves," by Dr. J. Shelton Horsley, of Richmond, Virginia.

This paper was discussed by Drs. Mayo and Horsley.

The following were given the privilege of the floor: Drs. John Young Brown, J. N. McCormack, Wm. H. Wathen, John R. Wathen, O. H. Elbrecht, W. D. Haines, Louis Frank, Ap Morgan Vance, Jas. B. Bullitt, and W. O. Bullock.

2. "End Results in Appendicitis Operations," by Dr. E. A. Balloch, of Washington, D. C., which was read by title, in the absence of the author.

3. "Foreign Bodies in the Œsophagus," by Dr. Stuart McGuire, of Richmond, Virginia.

Discussed by Drs. Long, Goldsmith, Royster, Horsley, Rosser, Hall, Haggard, and the discussion closed by the essayist.

4. "Gallstones in the Cystic Duct," by Dr. L. H. Dunning, of Indianapolis, Indiana.

5. "Common Duct Obstructions," by Dr. J. Wesley Long, of Greensboro, N. C.

6. "Two Unusual Cases of Surgical Affections of the Biliary Ways," by Dr. Joseph Ransohoff, of Cincinnati, Ohio.

These three papers were discussed jointly. The discussion was opened by Dr. Charles H. Mayo, and continued by Drs. Sherrill, Crile, Reed, Bonifield, Haggard, and the discussion closed by the essayists.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session. The Association reassembled at 3 P.M., and was called to order by the President.

7. "My Experience with the Downes Electrothermic Angiotribe in Pelvic and Abdominal Surgery," by Dr. J. Wesley Bovée, of Washington, D. C.

Discussed by Drs. Downes, Hall, Noble (Chas. P.), Kelly, Elbrecht, and in closing by the essayist.

8. "Operation for Large Rectocele," by Dr. Geo. H. Noble, of Atlanta, Ga.

Discussed by Drs. Kelly, Noble (Chas. P.), Bovée, Watkins, and the discussion closed by the essayist.

9. "Complete Tear Operations and Their After-Treatment," by Dr. Howard A. Kelly, of Baltimore, Md.

Discussed by Drs. Byford, Noble (Geo. H.), Noble (Chas. P.), Elbrecht, Rosser, Bonifield, Hunner, and the discussion closed by Dr. Kelly.

At this juncture the President appointed as an Auditing Committee, to examine the accounts of the Secretary and Treasurer, Drs. Stuart McGuire, Chas. L. Bonifield, and R. S. Cathcart.

10. "The Surgical Treatment of Cancer of the Head and Neck, with a Summary of 110 Cases," by Dr. Geo. W. Crile, of Cleveland, Ohio.

Discussed by Drs. Mayo, Ransohoff, Horsley, Parham, Ochsner (Edward H.), Rosser, Goldsmith, Nicolson, Bullitt, and the discussion closed by Dr. Crile.

On motion, the Association adjourned until 9.30 A.M., Wednesday.

SECOND DAY.—*Wednesday, December* 13, 1905.

Morning Session. The Association met at 9.30 A.M., with the President in the Chair.

11. "Late Results of the Treatment of Inoperable Sarcoma with the Mixed Toxins of Erysipelas and Bacillus Prodigiosus," by Dr. W. B. Coley, of New York.

Discussed by Drs. Stone, Oviatt, Crile, Whitacre, and the discussion closed by the essayist.

12. "Retroperitoneal Myomata of Uterine Origin," by Dr. I. S. Stone, of Washington, D. C.

Discussed by Drs. Noble (Chas. P.), Byford, Hunner, Hill, Morris, Ransohoff, Bonifield, Fort, Craig, and the discussion closed by Dr. Stone.

13. "Goitre, with a Report of 181 Operated Cases," by Dr Chas. H. Mayo, of Rochester, Minn.

Discussed by Drs. Crile, Rogers, Horsley, Carr, Nolen, Ransohoff, Whitacre, and in closing by Dr. Mayo.

14. "The Diagnosis of Renal Calculus," by Dr. Guy Le Roy Hunner, of Baltimore, Md.

Discussed by Drs. Ransohoff.

Dr. John D. S. Davis, of Birmingham, Alabama, First Vice-President, took the Chair, and President Bosher delivered his annual address. He selected for his subject "Qualifications Necessary for a Surgeon."

At the conclusion of the Address, on motion of Dr. I. S. Stone, a vote of thanks was extended to the President for his very interesting and instructive address, after which, on motion, the Association adjourned until 2.30 P.M.

Afternoon Session. The Association reassembled at 2.30 P.M., and was called to order by the President.

15. "Traumatism of the Ureter and Pelvis of the Kidney, with Report of Cases," by Dr. Rufus B. Hall, of Cincinnati, Ohio.

On motion of Dr. Howard A. Kelly, the paper of Dr. Hunner and that of Dr. Hall were discussed jointly. The discussion was continued by Drs. Kelly, Ransohoff, Young, Noble (Chas. P.), Ochsner, and the discussion closed by Dr. Hunner.

Dr. W. P. Carr, of Washington, D. C., presented an unusual case of brain tumor.

16. "Vicious Circle after Gastroenterostomy," by Dr. John B. Deaver, of Philadelphia, Pa., which was read by title in the absence of the author.

17. "Indications for Early Operation in Suspected Cancer of the Stomach," by Dr. Maurice H. Richardson, of Boston, Mass., which was read by title in the absence of the author

18. "Two Cases of Aneurysm Treated by Suture Inside the Aneurysmal Sac after the Method of Matas," by Dr. F. W. Parham, of New Orleans, La.

Discussed by Drs. Morris and Bullock.

19. "Laminectomy, with Report of a Case," by Dr. R. E. Fort, of Nashville, Tenn.

Discussed by Drs. McGuire, Horsley, Long, Perkins, Talley, and the discussion closed by Dr. Fort.

20. "Varicosity of the Saphenous Vein, with Resulting Varicose Ulcer," by Dr. Robert Carothers, of Cincinnati, Ohio.

Discussed by Drs. Ochsner, McGuire, Perkins, Mayo, and the discussion closed by the essayist.

21. "Early Diagnosis and Radical Cure of Carcinoma of the Prostate, with a Report of Forty Cases," by Dr. Hugh H. Young, of Baltimore, Md.

Discussed by Drs. Rogers, Whitacre, Ochsner, and in closing by the essayist.

On motion, the Association adjourned until 9.30 A.M., Thursday.

THIRD DAY.—*Thursday, December* 14, 1905.

Morning Session. The Association met at 9.30 A.M., with the President in the Chair.

22. "Scopolamine-Morphine-Chloroform Anæsthesia," by Dr. Horace J. Whitacre, of Cincinnati, Ohio.

23. "Scopolamine-Morphine-Ethyl-Chloride-Ether Anæsthesia," by Dr. H. A. Royster, of Raleigh, N. C.

These two papers were discussed by Drs. Parham, Watkins, Bullitt, Ochsner, and in closing by the essayists.

24. "Surgical Treatment of Floating Kidney; Post-Operative Results; New Operation; Report of Cases," by Dr. Floyd W. McRae, of Atlanta, Georgia.

Discussed by Drs. Noble (Chas. P.), Kelly, Mayo, Craig, Hunner, and the discussion closed by Dr. McRae.

25. "Overlapping of the Aponeuroses in the Closure of Wounds of the Abdominal Wall," by Dr. Chas. P. Noble, of Philadelphia, Pa.

Discussed by Drs. Wathen, Kelly, Rosser, and in closing by the essayist.

26. "Chronic Endometritis and a New Method of Treatment with New Instruments," by Dr. Daniel H. Craig, of Boston, Mass.

Discussed by Drs. Kelly, Hunner, and the discussion closed by the essayist.

Dr. Stuart McGuire, a member of the Auditing Committee, reported that the Committee had carefully and thoroughly examined the books and accounts of both the Treasurer and Secretary, and had found them absolutely correct.

On motion, the report of the Auditing Committee was adopted.

Dr. F. W. Parham presented the following report of the Council:

REPORT OF THE COUNCIL.

The Council begs leave to make the following recommendations:

1. That the Southern Surgical and Gynecological Association concur in the suggestion of the American Clinical Society as to the wisdom of the establishment of a weekly publication, abstracting the current surgical literature, somewhat similar to the Centralblatt für Chirurgie.

2. That the Southern Surgical and Gynecological Association heartily commend the praiseworthy effort of *Collier's Weekly* and other publications in the education of the people relative to the Patent Medicine evil.

3. The Council recommend that the resignations of the following members be accepted:

Dr. H. B. Gessner, of New Orleans.
Dr. F. A. La Rue, of New Orleans.
Dr. W. B. Rogers, of Memphis.
Dr. N. Senn, of Chicago.
Dr. Ennion Williams, of Richmond.

4. That the sympathy of this Association in session assembled be tendered the family in the loss of our esteemed Fellow, Dr. A. Palmer Dudley, of New York, who died in Liverpool, July 16, 1905, and that a suitable memorial of his life and work be published in the next volume of TRANSACTIONS.

5. The Council recommend as eligible for membership the following list of names, which exactly fills all the vacancies and completes the Constitutional limitation of membership, which is 200:

Dr. E. C. Dudley, of Chicago.
Dr. John C. Munro, of Boston.
Dr. David Barrow, of Lexington.
Dr. Randolph Winslow, of Baltimore.
Dr. Le Grand Guerry, of Columbia, S. C.
Dr. T. C. Witherspoon, of St. Louis.
Dr. John Young Brown, of St. Louis.
Dr. Willard Bartlett, of St. Louis.

Dr. Jas. N. Baker, of Montgomery.
Dr. A. M. Vance, of Louisville.
Dr. Jas. B. Bullitt, of Louisville.
Dr. Louis Frank, of Louisville.
Dr. Jno. R. Wathen, of Louisville.
Dr. Geo. A. Hendon, of Louisville.
Dr. H. S. McLean, of Richmond.

6. The Council recommend that Baltimore be selected as the next place of meeting, and that Dr. Howard A. Kelly be chosen as Chairman of the Committee of Arrangements.

7. The Council, finally, recommend Dr. George H. Noble, of Atlanta, for President; Dr. Stuart McGuire, of Richmond, for Vice-President; Dr. E. Denegrè Martin, of New Orleans, for Vice-President; the present Secretary and Treasurer hold over, and it is also recommended that Dr. Lewis S. McMurtry be designated to succeed himself on the Executive Council.

All of which is respectfully submitted.

W. D. Haggard, M.D.,
Secretary.

Dr. F. W. McRae, of Atlanta, Ga. moved that the report of the Council be adopted as the sense of the Association.

This motion was duly seconded by several and carried.

President Bosher appointed Drs. Fort and Ochsner to conduct the newly elected President to the rostrum.

The retiring President, in introducing his successor, said: The President-elect, Dr. Noble, is so well known to you that he hardly needs an introduction. I bespeak for him the kind treatment which you so generously bestowed upon me during my incumbency. (Applause.)

Dr. Noble, in accepting the Presidency, said: I wish to thank the Fellows for the compliment they have bestowed upon me in electing me to this high office. I feel sincerely grateful for it, from the fact that when we consider that there are so many men of distinction in this Association, it is hard to explain why you have selected your humble servant to fill this office. There are many others who can fill it with more grace and ability than myself. However, if I can in a small way contribute to the success of our next annual meeting, it will be a source of great pleasure to me. (Applause.)

27. "Fracture of the Lower end of the Femur; Operation Eight Months Afterward for its Correction," by Dr. George S. Brown, of Birmingham, Alabama.

Discussed by Drs. Carothers, Whitacre, Nicolson, Carr Rosser, Bullitt, Parham, Davis, McRae, and the discussion closed by the author of the paper.

28. "The Technique of Appendectomy," by Dr. W. P. Carr, of Washington, D. C.

Discussed by Drs. Brown, Nicolson, Davis, and in closing by Dr. Carr.

Dr. Chas. M. Rosser, of Dallas, Texas, offered the following resolution of thanks:

Resolved. That we appreciate most heartily the delightful entertainments provided under the splendid management of Dr. W. O. Roberts, Chairman of the Committee of Arrangements and that this visit to Louisville will be very pleasantly remembered by us all.

Dr. John D. S. David moved the adoption of the resolution, which was duly seconded, and unanimously carried.

On motion, a paper by Dr. Charles M. Rosser, of Dallas, Texas, entitled "Neglected Appendicitis," was read by title, in accordance with the wish of the author.

As there was no further business to come before the meeting, either scientific or otherwise, the Association, on motion, then adjourned, to meet in Baltimore, Maryland, 1906.

W. D. Haggard, M.D.,
Secretary.

The Association does not hold itself responsible for the views enunciated in the papers and discussions published in this volume.

W. D. HAGGARD, M.D., *Secretary*,
NASHVILLE, TENN.

ANNUAL ADDRESS OF THE PRESIDENT.

By Lewis C. Bosher, M.D.,
Richmond, Va.

In being elected to the Presidency of the Southern Surgical and Gynecological Association, I have been the recipient of an honor conferred on me by the Fellows which I highly appreciate and for which I desire to express my grateful thanks.

The subject which I have chosen for this address requires a few words of explanation, since in the selection of my theme I have departed from the precedent of addressing my remarks primarily to this body itself. All of us can bear witness to the fact that to-day there are men engaged in the practice of surgery, who, by reason of their lack of proper training, are thereby doing injustice to themselves, to the profession and to the public. Since there could be no greater mistake on the part of any young man than the selection of a specialty for which he lacks the necessary requirements, a general consideration of just what qualifications are needed as a basis for a successful career in surgery seems to me a subject worthy of discussion on this occasion.

So forcibly has this matter appealed to me for many years, that, very shortly after my election to this position, I determined to take advantage of the opportunity of dealing with the subject on the present occasion, not, it is needless to say, for the enlightenment or guidance—scarcely, I fear, for the entertainment—of the members of this Association, but with the hope that my words, coming through this body of

men, who are teachers of our great art, whose utterances are authoritative and whose precepts are accepted, might carry with them a certain amount of reflected authority and might serve to deter some at least from entering a field for which they are not equipped, and might even, perhaps, cause some others who are now rashly engaged in the so-called practice of surgery either to supply their deficiencies or abandon the calling.

With this idea in mind, I lost no time in putting my views in shape for presentation. Although, sometime after I had prepared my paper, I had the privilege of hearing the oration of the Chairman of the Surgical Section of the American Medical Association, at the Portland meeting, in which he treated of the same subject in a most forceful, lucid and emphatic way, this seems to me no reason for abandoning my original intention, but rather a proof of the importance of the subject and an encouragement to follow up his opening, even though some similar thoughts may of necessity be dwelt upon.

To the recent graduate in medicine, no department of his chosen profession appeals with the same force as does surgery. While a student, he has been impressed by the brilliancy of the results secured by his professors before his very eyes; at the meetings of the alumni the clinics in surgery have been crowded, while those in other branches have usually been either slimly attended or else attended as a compliment to the individual holding them, rather than from actual interest in the subject; in most medical colleges the prominence of the professors of surgery in all faculty affairs is well known; while, considering the more material side of the question, he has little trouble in ascertaining that it is no unusual thing for a surgeon to secure for a single operation, occupying but an hour or two, or even less, a fee greater than the entire collections of the general practitioner for a week's steady work, with broken rest and with cares and responsibilities innumerable. On leaving college, if he

enters into hospital service these facts are impressed on him with even greater force, and later on, having himself entered the ranks of struggling practitioners, the same lessons are borne in upon him with increasing emphasis.

Little wonder is it, then, that so many young medical men, bearing all these things in mind, decide that they, too, will enter this alluring field, where, they believe, they will effect such marvellous results, in brilliant cures, in abundant pecuniary reward, in the homage of their fellow men, and, if moved by even higher motives, in the actual good they may do to suffering humanity.

These young men are all too prone to see but one side of the picture and to overlook the fact that here, as in all other pursuits, success comes only as the reward of special fitness.

The term surgery is still synonymous in the popular mind with cutting, and at once calls up visions of horrors of the operating room, with its rows of glistening instruments, the nauseating odor of the anæsthetic, the insensible patient, and blood. Holding this view of surgery itself, surgical ability is commonly held to be identical with mere deftness of operative technique, while skill and promptness in diagnosis, the recognition of the possibilities of non-operative measures, the power to distinguish between operative and non-operative cases, the selection of the most suitable operation, judgment in knowing just how far to go—these and the numberless other things of a similar nature, which constitute the real tests of surgical ability, are given little thought.

Were this failure to draw the correct distinction between the true surgeon and the mere skilful operator confined to the lay mind, consideration of this subject on the present occasion would lose its point. But these same ideas, to a less exaggerated extent it is true, find place in the minds of many of the young men for whose special benefit these remarks are intended.

In a certain sense the preparation of the future surgeon

may be said to begin before his birth, since here, as elsewhere, blood will tell. Certainly the environment of very early life has a marked influence, for here the foundations of his character are laid, and even at this time there may be awakened in him a liking for the healing art which will have much to do with his selection of a career later on.

The importance of an academic education is too well recognized to require more than passing mention. Many a man has attained success in surgery without this advantage, but we are dealing with the rule, not the exception. This academic education should be truly liberal, both in quantity and quality, and should include as much as possible of studies of a scientific nature, especially biology, physics and chemistry. Of these three branches, physics will prove of the greatest use to the surgeon, while biology and chemistry are branches of more practical value to the general practitioner. But the scientific habit of thought cannot be too soon established, hence every study of this class is of service. At this time, too, will be laid the foundations of that general culture which will prove an invaluable possession in after life.

At the very beginning of his medical studies, the best available school should be chosen. While at medical college, our future surgeon, no matter how firmly he may have decided upon surgery as a career, should secure as thorough an all-round medical education as possible, not neglecting those branches which, as it seems to him then, are not directly related to the practice of surgery. Only thus can he attain that broadness of view which will later on enable him to realize that the cases which come under his care are subject, in addition to the condition for which he is especially consulted, to the many other ills, both medical and surgical, which afflict mankind in general. Only thus can he appreciate the influence of mental conditions and gain an insight into the natural recuperative powers of the human system, both of which should be factors in influencing his decision

as to the propriety of operating and in considering the question of postoperative recovery. Only thus, in short, can he hope to avoid the warping which is only too commonly seen in specialists in every branch, and which, so far as it relates to surgery, has given rise to the not altogether unjustifiable popular dread of consulting a surgeon, lest doing so should of necessity mean submitting to an operation.

After the completion of his course at medical college, a term of hospital service is nowadays considered an absolute essential. No matter what advantages the medical college has afforded in the way of clinics and opportunities for practical work, the newly fledged doctor must learn in the school of actual experience. If he has real ability he will undoubtedly learn in private practice, but it will be only after many and costly mistakes, many of which may be avoided by proper hospital training.

In the matter of deciding what hospital he shall enter (provided it is with him a matter of choice), the personnel of the attending staff and the rules as to the duties of the house staff are the two points of chief importance. Service in the most pretentious and largest hospital under men of mere mediocrity and with improper discipline is far less to be desired than a position in a hospital where, perhaps, the cases are few but are seen under a master, and where the interne's time is divided into terms of service in both the medical and surgical departments, in the order named, if he aspires to enter the practice of surgery afterward. In the best hospitals to-day, the new recruit occupies at first an entirely subordinate position, gradually being given more and more responsibility as he becomes qualified for it.

Having completed his term of hospital service, many young men find it to their advantage to undergo a still further apprenticeship as special assistant to some surgeon of prominence. This affords the opportunity to observe more intimately the methods of some single man of ability and is of further value in giving an insight into the manner

of dealing with private patients, a knowledge of which often decides between success and failure.

What has been said of the necessity of other things besides mere operative ability must by no means be taken as minimizing the importance of the latter. The diagnosis having been made, and after the exercise of proper judgment in deciding as to the advisability of operating and as to what operation should be undertaken, the best surgeon is he who possesses the greatest operative skill. This, though perhaps the most easily acquired of all the accomplishments of the surgeon, demands longer experience. Here too, as in the attaining of other acquirements, the time spent as hospital interne and as assistant to some able surgeon will prove invaluable. Daily observation of the method of others who possess the operative ability he himself wishes to attain is a prime essential. Thus will he unconsciously become familiar, in a practical way, not only with the principal operations themselves, but also with the thousand minor details which are indispensable. He will, moreover, learn how to meet the many emergencies which inevitably arise during an operation and which demand prompt and decisive action, and he will have impressed upon him the necessity of being ready, at any stage of the operation, to modify the opinions formed beforehand and, in consequence, similarly to modify the operative procedure, either in whole or in part. He will learn how to bring to bear that nice judgment in deciding, while operating, between those cases which will admit of the most deliberate, though never dallying, attention to the minutest detail and those in which it is imperative to keep the patient as short a time as possible on the table, even at the sacrifice of otherwise important details of the operation.

After this he will still have much to do before he is himself an able operator; for all things appear easy and simple when done by a master hand, and no amount of mere observation of the work of others can of itself make a good

operator. Operations on the cadaver and on the lower animals are invaluable in conferring technical skill without any attendant risk to human life or well-being. Along with this he may undertake some of the simpler operations on the human subject, gradually advancing to those of greater difficulty, in proportion as his experience in diagnosis becomes more extensive, his judgment more trustworthy, his eye and touch more practised and his hand more steady.

During his entire hospital experience he will be constantly impressed with the fact that the possession of mere brilliant operative ability, unless combined with the other qualifications of a surgeon, may make a man a dangerous surgeon rather than a great one. For the same reason, antiseptic and aseptic surgery, whose benefits to the human race can scarcely be overestimated, are not an unmixed blessing; for, by the very safety which they confer on surgical operations, they enable many men lacking the qualifications of the true surgeon to undertake capital operations with immunity from immediate ill consequences.

In connection with the value of the training as hospital interne, a few words as to the general attitude of our young surgeon during this period of his career seem to me important. It is no uncommon thing to find even the newest recruit in hospital service undertaking to assume an importance utterly out of proportion to his ability, or, rather, in inverse proportion thereto. This is shown most prominently in the tone assumed in speaking of the members of the attending staff, finding expression not infrequently in actual criticisms of his superiors in the presence of his fellow members of the house staff, before the nurses, and, not infrequently, before the patients themselves. Leaving out of discussion the woful breach of professional ethics which such a course involves, these young men should realize that they can best secure the full advantages of their hospital training by confining their attention strictly to their own especial duties. The really valuable assistant is he who

does well the things falling in his own proper domain. If he does this conscientiously he will have neither time nor inclination to indulge in meddlesome criticisms, and by doing his own part well he will not only inspire such confidence as will lead his superiors to entrust to him work of ever increasing importance, but he will gain an insight into the responsibilities resting upon a surgical assistant, which will stand him in good stead when he himself shall need help in this direction.

Having completed his college course and served his apprenticeship as hospital interne, and perhaps as special assistant, our young man is now ready to start off on his own responsibility. In some cases this step is made easy by his now being taken into partnership by the surgeon to whom he has acted as assistant, but usually this is not the case, and at this time he casts off from his moorings and begins an independent career. And now, no matter how thorough his training, days of discouragement are likely to follow, days during which he may be further disheartened by seeing men of far inferior parts succeeding by means of tricks which he would scorn to employ or perhaps by means of some special pull. His attitude during this time should be that expressed in the words of Confucius, who said: "I will not be concerned at men's not knowing me; I will be concerned at my own want of ability." If he is all right in the last respect, gradually, with such work as will come his way (some of it from those who have all along been watching his career, and some of it thrown in his path by his former associates), and, especially, sustained by the knowledge of his own fitness and power to cope with whatever may come along, success will surely follow.

Most men at this stage of their careers find it necessary to take practice of whatever kind may come their way. This is a fortunate state of affairs, since the same reasons which made it advisable for him as a student to neglect no branch of his medical studies now make it important for him to acquire that breadth of view which is notably absent in the

man who settles down too early in life to the exclusive practice of a specialty. As his work increases he may gradually find it possible and advisable to confine his attention more and more to surgery alone.

Besides the special qualifications which have thus far been considered, it is scarcely necessary to do more than merely mention the many requirements of a general nature, which, while of essential importance in the development of the able surgeon, are of equal importance to success in any sphere of life. Robust health, tireless energy, rigid honesty, temperate habits, are requisites in any successful career. Attractive personality and abundant *savoir faire* are desirable here as in every calling in which one has much to do with one's fellow men.

It may be pretty confidently asserted that any young man equipped by nature and by training along the lines above laid down, and who has given careful thought to the selection of a proper field for his activities, may count on a reasonable measure of success as a surgeon. There are in our country to-day thousands of men who have thus risen to responsible positions and who may be regarded as successful surgeons. Of these thousands, a considerable number have gone farther and have come to be recognized as surgeons of prominence, while still others, a very few, have attained such eminence as to be recognized as the real leaders of our profession.

Will the means by which these last have reached their present position admit of successful analysis? Not to more than a limited extent; for here, as in all cases where we have to deal with true genius, there is an elusive something which ever evades our grasp. Yet we can usually understand, in those instances which come under our immediate notice, somewhat of the factors which have contributed to the end. Unusual energy and determination, courage which never fails in the face of difficulties or even of temporary defeat, quickness of intellect in placing at their true value

the results of the research of others, thus avoiding the error of being misled by attractive fallacies while, at the same time, promptly seizing and applying discoveries of real value; boldness of initiative, never going to the extent of dangerous radicalism; broad views in dealing with one's patients, with one's fellow practitioners, and with the world at large; and, lastly, that indefinable something which we call personal magnetism—these are among the factors which may serve to convert mere success into pre-eminence.

A single small class of men may perhaps constitute an exception to all that has thus far been considered. In every lofty calling in life we find a few men—at times some of the very ablest of their profession—who apparently defy all the ordinary rules which apply to their fellows in the craft. And so, as in the similar cases in other fields, we occasionally find men who seem to have been born surgeons, who with no apparent external advantages over even the least favored of their fellows—save such advantages as their own persistence, urged by unquenchable fire of ambition, has wrested from adverse environment—going on to achieve not only success but distinction and fame. These are but the exceptions which prove the rule, and even to such men at the beginning of their career, the same advice should be given, since thereby the unfit man might be restrained from committing a fatal error, while he who has in him the fire of true genius will not be deterred by words of any man.

In conclusion, we must realize that this is a subject which concerns mankind in general, therefore is it not incumbent upon us, as teachers and practitioners of surgery, to make it plain to the public that there is a material difference between the trained surgeon and the novice? This education will enable the public to discriminate in a wholesome manner and will ultimately have the effect of rendering it apparent to the candidate for surgical practice that he must properly equip himself before he can stand before the world as a representative of the great surgical art.

SURGICAL REPAIR OF INJURED NERVES.

By J. Shelton Horsley, M.D.,
Richmond, Va.

The principles of nerve suture are so intimately connected with degeneration and regeneration of peripheral nerves, that a brief review of the histological process involved may not be inappropriate. The method of regeneration of a mixed nerve has been the subject of much discussion, and even now there is no view that receives the general sanction of neurologists. The Wallerian or continuous theory, which claims that regeneration of the axis cylinder occurs from the central stump only, is being somewhat discredited. Recent researches tend to confirm the discontinuous theory or some of its modifications. Huber and Howell in 1892, and later Bethe, of Strassburg, have shown quite definitely by numerous experiments that regeneration of an injured nerve may be practically complete in young animals without any connection with the central end. In older animals regeneration without connection with the central stump also occurs but is imperfect. Schutte (*Cent. f. allgemeine Pathologie,* vol. xv. p. 917), after an exhaustive review of the literature, corroborates this, and maintains that degeneration always occurs after division of a nerve no matter how accurate the approximation or clean the wound, though degeneration and regeneration may proceed simultaneously. As would be expected, the destructive effect of suppuration increases degeneration in the central end. While Schutte concludes that central connection is not necessary to regeneration in a peripheral

nerve, it is true that such connections with the so-called trophic centre must sooner or later be made in order to preserve the nerve in a healthy condition. Of course there can be no physiological function without this connection, no matter how perfect the anatomical repair may be. It is also true that regeneration is more prompt and more nearly perfect when the peripheral and the central ends are united than when they are separate.

It has been shown by a number of investigators that if a severed regenerated nerve is again cut, degeneration will take place in the distal segment; but the segment between the first and second cuts will not degenerate to any marked extent, though it has been entirely separated, both from the cord and the peripheral segment. There seems to be no satisfactory explanation of this phenomenon, but its occurrence shows that neither the ganglionic cells of the spinal cord nor the peripheral nerve endings are essential to regeneration, a fact that might prove valuable where there had been multiple injuries along the course of a nerve.

In view of the constant degeneration of the peripheral segment of a divided nerve, it is somewhat difficult to explain the early return of function in many cases. Thus, Victor Horsley (*Practitioner*, August 1899) mentions a case of suture of the ulnar nerve followed in twenty-four hours by return of sensation in the little finger. Peterson (*American Journal of the Medical Sciences*, April, 1899) reports a case in which sciatic nerves of a dog were used to bridge a defect in the ulnar and median nerves in man with return of sensation the day after the operation. Two weeks after the operation sensation was almost complete, and the natural color of the hand was restored. There are many other reported cases following a somewhat similar course. Victor Horsley says they may be explained as follows: If a nerve is cut and the freshly divided ends are united, two excitable masses of nerve protoplasm are brought into contact, and one may conduct stimulating impulses from the other just as when two freshly

divided pieces of muscle are fixed together excitement of one piece will produce contraction of the second by transmission of the electrical energy which caused contraction of the first piece. For a few days after suture of a nerve, the excitability of the nerve protoplasm remains active, then it gradually disappears as a rule, though occasionally it is permanent.

Symptoms. The symptoms of an injured nerve depend to some extent upon the character of the injury. Complete aseptic division of a mixed nerve results in abolition of motion and sensation in the area supplied by this nerve and in simple atrophy, but no trophic disturbance, such as glossy skin or blebs, results. If, however, the lesion is an irritating one, trophic symptoms may appear though the destruction of the nerve is only partial. Such disturbances occur after suppuration involving a nerve, or the gradual encroachment of a tumor or callus, or after constant pressure from a dense cicatrix. Pain is not present if the destruction of the nerve is complete, and of a non-irritating nature. When the whole nerve is not severed, or if the lesion is of an irritating nature, pain may be severe and is due to the abundant supply of sensory nerves to the nerve sheath, which are not only excited by the injury, but stretched by the resulting vasomotor paralysis along the nerve. Electrical reactions, either galvanic or faradic, depend upon the ability of the nerve to functionate to some extent. A nerve that has completely degenerated can no more convey electrical stimulation than could a fibrous cord, yet the fact that such stimulation fails to produce a contraction does not necessarily mean the complete absence of all nerve fibres, for some may exist yet be so few in number and so feeble in conducting power as to produce no appreciable reaction.

Time of Operation. The time which should elapse after traumatic paralysis of a nerve before operation for its relief is a question of much importance. B. Sachs (*Journal American Medical Association*, vol. xliv. p. 1142) says three and a half months after facial palsy is too soon to consider

operation. Dr. Hammond mentioned the case of a boy who developed facial palsy after a mastoid operation, and without any attempt at nerve suturing motion in the affected muscles, was first noticed fifteen months later. Henricksen (*Lancet*, April 18, 1903) thinks it unwise to wait over a month if there is no improvement. Others advise waiting as long as eighteen months before operating. Much depends upon the character of the injury. If the nerve has been divided by a clean cut, as after a stab wound, and primary union has resulted, the surgeon would be justified in waiting twelve or eighteen months for the normal functions to return; but if the injury was a crush, or if suppuration resulted, two or three months should be all the time allowed to elapse without improvement. When there is compression, as from callus or a tumor, operation should be performed at once. No operation for nerve suture should be abandoned because of the length of time that may have elapsed since the trauma. While regeneration and good functional results are more liable to occur when there have been only a few months from the time of the injury to the date of operation, still a number of successful cases are reported where many years have elapsed since the injury. For instance, Brenner (*Wien. klin. Wochen.*, 1891) records a case in which successful suturing was done on the median nerve ten years after the original injury.

Methods of Operating. Before mentioning the different procedures used for the repair of defects in nerves, it may be well to call attention to the statement of Bowlby (*Lancet*, July 26, 1902) that the function of some nerves in the same individual is restored more readily than that of others. He says better results are obtained after suture of the peroneal or the musculospiral nerve than after suturing either the median or the ulnar. If this be true, it would not be accurate to compare results following one method of operating on the musculospiral, for instance, with a different method employed on the median, as the same operation that succeeded in the

nerve whose function was easily restored might fail in a nerve more difficult of repair.

The surgical methods of repairing nerve defects, may be classed as follows:

1. Simple suture.
2. Flap operation.
3. Nerve bridging.
4. Nerve implantation or anastomosis.

1. Under the head of suture are included not only those cases in which the ordinary technique of freshening the ends of the nerve and approximating them with fine sutures into the nerve substance and into the sheath is employed, but also cases in which other procedures are necessary to facilitate this approximation. Resection of a portion of the long bone has been done when it was found impossible to coapt the nerve ends in any other manner. Dr. C. A. Powers (*Annals of Surgery*, vol. xl. p. 642) has collected from the literature seven such cases, two of these operations being performed by Keen. Surrounding the site of the nerve suture by some kind of tube—tubulization is advocated by some writers, and has been employed by Guelliot and by C. Foramiti. Foramiti (*Archiv. f. klin. Chir.*, vol. lxxiii. No. 3) uses the artery of a calf for this purpose. It may be employed fresh when it is taken aseptically from the calf and immediately used after rinsing in salt solution, or the artery may be boiled and then hardened in a formalin solution. It is claimed that such a procedure prevents adhesion of the nerve to surrounding tissue, and at the same time affords a direct path for the nerve fibres. Aside from the difficulty of securing a proper tube, the greater danger of suppuration following its introduction and the interference with the nutrition of the nerve are serious objections.

2. Flap operations consist of splitting from one or both ends of the nerve sufficiently long flaps to bridge the defect and suturing them together. There are a few successful cases reported though this method is not popular as too much

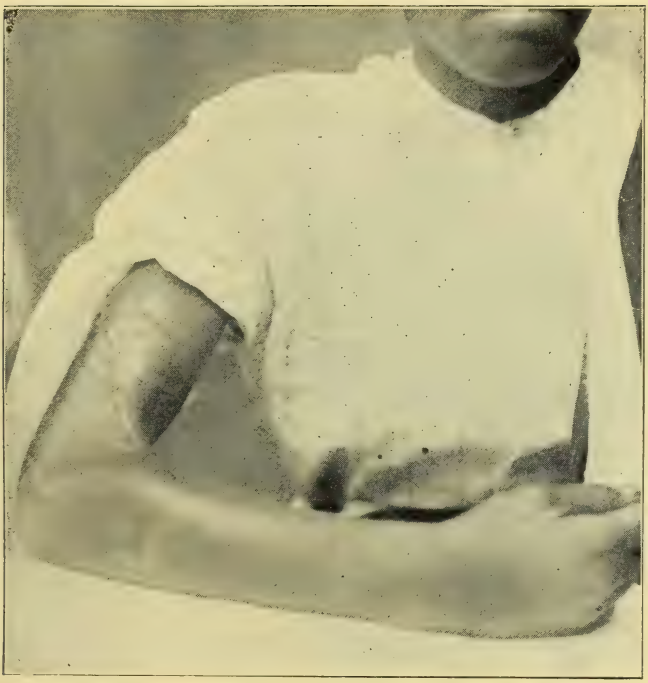
healthy nerve tissue is sacrificed in making the flaps. Most of these operations have failed.

3. The term "nerve bridging" may be applied to that class of operations in which some foreign substance is used to bridge the defect between the two ends of a divided nerve. Dr. Powers, in a most interesting article (*Annals of Surgery*, vol. xl. p. 632), reports a case in which he filled out the defect in the external popliteal nerve of a man by transplanting four inches of the sciatic of a dog. The nerve was taken from the dog and immediately transplanted. The wound healed primarily, and forty-five days later all forms of sensation were reported normal, but the muscles supplied by this nerve would not react to the strongest faradic current. Eight years after the operation, sensation over the region normally supplied by the peroneal, had practically disappeared and the muscles remained entirely paralyzed. Powers had collected from the literature twenty-one cases in which nerve tissue from a lower animal was used to correct defects in a human nerve, and of these cases only twenty-one per cent. may be said to have terminated in a satisfactory way. He concludes that nerve bridging or transplanting should be discarded.

The nerve tissue transplanted from the lower animal in all probability has no intrinsic value in repairing defects in human nerve, but merely serves as any organized tissue would under similar conditions, in providing a path for the growing nerve fibres to follow and so protecting them from the surrounding tissues. The *suture a distance*, where several strands of catgut connect the ends of a nerve, involves exactly the same process and should be included under this head.

4. The term "nerve implantation" may be applied to operations in which the peripheral and the central portion of an injured nerve are implanted into a neighboring healthy nerve, or in which the peripheral end only is so implanted. While nerve implantation has not been performed as often as nerve bridging, the results have been more encouraging,

Fig. 1.



Taken January, 1905, about two weeks after the second operation, and fourteen months after the first. It shows the scar over the musculospiral, and the hand flexed as far as possible at that time.

Fig. 2.

Taken January, 1905, about two weeks after the second operation, and fourteen months after the first. Note the dull and crumpled appearance of the nails of the index and middle fingers as compared with the other nails; also the enlarged and glossy appearance of the distal joint and last two phalanges of both of these fingers.

Fig. 3.

Taken November 16, 1905, about ten months after the second operation, and two years after the first. Nails of index and middle fingers are short from loss of substance at tips of these fingers from previous ulceration, but are of normal color and smooth. Size and appearance of distal joints and phalanges of these fingers are about normal.

Fig. 4.

Taken November 16, 1905, about ten months after the second operation and two years after the first. Note good flexion of fingers and hand, also slight keloid development at scar over the median at the last operation. Just above this is part of the scar of the first operation.

the proportion of successes being about 50 per cent. I do not include those operations for correction of deformities following such diseases as infantile paralysis, where the lesion is in the spinal cord, and the nerve fibres are secondarily involved through their whole extent, but merely those cases where there has been some local injury to a peripheral nerve. Besides the clinical evidence, a number of experiments have demonstrated the feasibility of such an operation as implantation. In an experiment by Spitzy (*American Journal of Orthopedic Surgery,* August, 1904) the peroneal nerve was grafted on to the tibial. The clinical results were good and microscopic examination of the site of the grafting plainly showed the passage of fibres from the tibial nerve into the implanted distal portion of the peroneal. As between the last two methods of correcting defects in nerves (that is, nerve bridging and nerve implantation), a study of the literature on this subject, both from an experimental and clinical standpoint, seems to show the superiority of nerve implantation.

The following case of nerve implantation may be of interest both from a surgical and an anatomical standpoint.

CASE.—H. J., aged twenty-one years, was kindly referred to me by Dr. Geo. Ben Johnston. He was a large, muscular negro whose previous health had been good. Family history of no significance. In August, 1903, he was thrown some distance by the explosion of a boiler. There was a fracture of the leg, a scalp wound, and a severe trauma to the soft parts of the upper right arm. The bone was not fractured nor was the shoulder dislocated, and the skin was only broken at a small place on the outer side of the arm. He was unconscious for several hours, but on recovering consciousness found his right hand and forearm paralyzed. November 17, 1903, he came under my care. His other injuries were nearly well, but so far as could be made out, complete paralysis of both sensation and motion existed in all of the forearm and hand except in those muscles supplied by the

ulnar nerve, and that portion of the skin supplied by the ulnar and musculocutaneous nerves. In the upper arm, the action of the triceps was unimpaired, but flexion was weak. Besides marked atrophy no trophic disturbances were present. An incision was made over the upper part of the course of the median nerve.

The upper brachial artery was obliterated and no trace of the median nerve could be found. In the place of the nerve and artery was an indistinguishable fibrous mass. The ulnar nerve was normal. After extending the incision down to the middle of the arm, the median nerve was found. It was in fairly good condition here, but the line of demarcation between healthy nerve tissue and an absolute fibrous cord was quite sharp and distinct. The median from its origin for a distance of two-and-one-half inches had been completely crushed and its sheath with the remains of the brachial artery formed a fibrous mass in which no trace of nerve tissue could be found. It was impossible to stretch the nerve or to form a flap to bridge such a defect, so implantation into the ulnar was done. The median was cut almost across half an inch below the point where it first appeared healthy, and the peripheral end sutured into a nick in the ulnar. A fine needle and fine chromic catgut were used, one suture being put into the nerve substance and several into the sheaths of the ulnar and median. Care was taken not to tie the sutures too tightly. The median was not cut entirely across, a few fibres and the outer part of the sheath being left as they served to hold the nerve to the fibrous mass just above it and thus relieved some of the tension on the sutures. From the fact that the triceps was unimpaired, the injury to the musculospiral must have been lower down, so no attempt was made to find it and the wound was closed. Union was by first intention. The patient left the hospital two weeks after the operation. He reported later that improvement in motion and sensation began within a month after the operation. As he was not very intelligent, it was difficult to get an accurate account

of the progress of improvement, but it was evidently quite rapid after this time.

On January 15, 1905, he returned to the hospital. Flexion of all the fingers was present, though much stronger in the little and ring fingers than in the others. The thumb could be flexed or adducted as a whole, but chiefly from the carpo-metacarpal joint. The last phalanx could be flexed upon the first very slightly. Much to my surprise, extension was present in the hand and all of the fingers and the thumb, and had evidently improved along with flexion. The probable cause of this will be discussed later. Sensation to pain and touch was present over the palm of the hand and palmar surfaces of the fingers and thumb, though over the ulnar side it was prompt and normal while retarded and less acute over the region supplied by the median. Sensation to touch and pain was present over the whole forearm, though somewhat impaired over the back of the forearm, and back of the hand except to the ulnar side of the back of the hand and forearm, which was normal. Sensation over the back of the little finger was satisfactory, and was also present on the back of the thumb and the ring finger, though not so marked. There was complete anæsthesia over the backs of both the index and middle fingers from the roots of the nails to near the metacarpophalangeal joint, where it gradually blended into very much impaired and retarded sensation over this portion of the back of the hand. One of the remarkable features was the presence of trophic disturbances in the nails of the index and middle fingers. About four months after the operation, ulcers appeared on the tips of these fingers, and refused to heal entirely; at the same time the nails became crumpled. This condition is shown in the photograph taken January, 1905. There had been no injury to these fingers. No affection of this character was present at the time of the operation in November, 1903.

A second operation was done on January 17, 1905. Both operations were performed at my clinic, at the Memorial

Hospital, Dr. H. H. Levy, Emeritus Professor of Medicine in the Medical College of Virginia, and Dr. J. W. Southal being present, in addition to the students, at the last one. A short incision just above the elbow exposed the median nerve, which appeared normal. The musculospiral was then exposed to the outer side of the elbow where it lies between the brachialis anticus and supinator longus. It was small and yellow, and presented distinct evidences of marked degeneration. This nerve was followed up the arm for three inches where it was cut across and a fine silk suture inserted. With a closed hæmostatic forceps an opening was burrowed beneath the biceps from the lower angle of the incision exposing the median to the lower angle of the incision over the musculospiral. The forceps then seized the suture previously placed in the musculospiral, and so drew this nerve to the median. A slight nick was made in the median and the musculospiral was implanted with fine sutures of chromic catgut, in the same manner as the median had been implanted previously. The wounds healed by first intention. The operation did not interfere with the motion of the hand or fingers, with the exception of apparently somewhat lessening the flexion of the thumb, which may have been caused by the slight nick in the median.

On November 16, 1905, the patient reported for examination. He was greatly improved in every respect. The trophic disturbance of the index and middle fingers had disappeared and the nails have straightened, as shown in the photograph, though from loss of substance at the tips of the fingers these nails will always be shorter and more irregular than they would be normally.

The following report was kindly made for me by Dr. M. Call, Adjunct Professor of Medicine in the Medical College of Virginia, and is the result of his examination of this patient on November 16 and 17, 1905. "Extension of forearm good. Flexion of forearm excellent with slight degree of pronation. With forearm extended, pronation and supination are good.

Flexion and extension of wrist are both present, extension being the stronger, but both are of good force.

"*Phalanges.* Flexion of little and ring fingers good; of middle finger less strong. Index finger has less strength than the middle, but all these fingers flex with considerable strength. All the phalanges flex, except the first phalanx of the index finger, which has scarcely perceptible motion. Extension of all the phalanges occurs; that of the middle and index fingers being weaker than that of the little and ring.

"*Thumb.* Slight flexion of terminal phalanx, less marked flexion in the first phalanx. Extension present in terminal phalanx, less marked in first phalanx. Abduction and adduction both present to slight extent. Very little backward movement. Rotation cannot be accomplished. With the hand at rest, the thumb is slightly adducted.

"*Nerves.* Galvanic stimulation of nerves gives the following result. Ulnar, below the point of implantation, gives marked contraction. Stimulation of the median gives marked contraction, but weaker than results from stimulation of the ulnar, especially weak in the thumb muscles supplied by the median. Musculospiral could not be located at the radial point, though the corresponding nerve on the uninjured side showed marked contraction. Stimulation of area just over the region of the posterior interosseous nerve gives marked response in muscles supplied by that nerve, though the contraction of some of these muscles was due to unavoidable direct stimulation of the muscles themselves.

"Stimulation of the ulnar nerve above the implantation of the median gave ulnar and median response, the ulnar group being markedly stronger.

"No anæsthesia or paræsthesia. Partial cutaneous analgesia was marked on dorsal surface of middle finger and on plantar surfaces of index and middle fingers. There is marked atrophy in the muscles of right arm, forearm, and hand as compared with the well-developed muscular left side.

"The nails on the index and middle fingers show evidence of past trophic disturbances."

Concluding Remarks. There are two features of this case that call for particular attention. The first is an anomalous nerve supply to the extensors of the forearm. They were completely paralyzed at the time of the operation, but, as the triceps was normal, the injury to the musculospiral must have been lower down in the arm, and it was thought unwise to attempt any operation upon it till the median had been repaired. However, after repair of the median the extensors improved along with the flexors. The second operation showed the musculospiral degenerated to a marked degree, and after complete section, motion of the extensors was not interfered with; so this improvement of the extensors could only be accounted for in two ways: First, there may have been a high bifurcation of the musculospiral, the radial following the normal route of the musculospiral, the posterior interosseous, which may have been only temporarily injured, taking some other course. Secondly, the posterior interosseous may have been given off from, or at least have freely communicated with, the anterior interosseous of the median.

I have stated the case by letter to Dr. George A. Piersol, Professor of Anatomy in the University of Pennsylvania, who replied as follows:

"By your first operation, we may assume that the median was regenerated. Now, in some reported cases, the anterior interosseous of the median had communications with the posterior interosseous of the musculospiral. Supposing that such paths were present, might not their existence have guided an unusual number of regenerating fibres to the extensors, under the stress of needed additional supply, since the usual source (the musculospiral) was defective?"

Dr. C. M. Miller, Professor of Anatomy in the Medical College of Virginia, agrees fully with Dr. Piersol in this solution of the case.

The second point of special interest is the trophic disturb-

ance on the backs and tips of the index and the middle fingers. It is claimed by many anatomists that the tip of the index finger and the back of its last phalanx, together with the tip and back of the last and a portion of the second phalanx of the middle finger, are supplied by the median and not by the radial; though even these anatomists admit that there is free communication between the radial and median in this region. It must also be recalled that the root of the nail extends half-way between its apparent base and the last phalangeal joint. Trophic disturbances in this area would unquestionably affect the nail profoundly, and the supply of the radial nerve could very readily reach this region from a normally distributed nerve. But in this case, with such an evidently anomalous nerve supply of the forearm and hand, it is likely that the radial went as far as the tip of the index and middle fingers. The fact that the posterior interosseous probably derived most of its nerve fibres from the median would tend to show that practically all of the fibres from the musculospiral went into the radial nerve, which would then be much larger than usual, and consequently would be likely to be more widely distributed than is usually the case. The branches of the ulnar can easily account for the undisturbed condition of the ring finger, and those of the musculocutaneous for the healthy appearance of the thumb. If the trophic disturbance of the index and middle fingers had been due to the median nerve, the thumb would have been affected. Mr. Hilton, in his classical work *Rest and Pain* (page 195), records the case of a sailor in whom the pressure of callus on the median nerve produced ulceration of the index and middle fingers and of the thumb. All of the ulcers healed promptly when pressure on the median was relieved. As has been mentioned above, complete mechanical destruction of a nerve unaccompanied by irritating conditions should not produce any trophic disturbance beyond simple atrophy. Such was the case with the median nerve. The radial, on the contrary, had undergone marked

degeneration and the musculospiral had evidently received sufficient injury to cause total suspension of the function of the radial for some months, with the probability that without implantation its function would never have been satisfactorily restored. The lesion was probably of such a character that after several months, just enough of its function returned to promote the trophic changes mentioned. That the radial nerve, at the time of the second operation, was incapable of conducting impulses to any marked degree, was shown by the absence of appreciable change in the area of anæsthesia over the back of the index and middle fingers following the section of the musculospiral nerve. The disappearance of the trophic symptoms a few months after the musculospiral was implanted into the median, also tends to show that they were due to the radial nerve.

DISCUSSION.

Dr. Charles H. Mayo, of Rochester, Minnesota.—The subject of repair of nerves is one most interesting to surgeons. The ideas that have come up more recently of switching nerves by joining one to another have undoubtedly proven successful in many instances.

A question that has interested me more especially in this line of work is the difference in the ability of repair of a sensory nerve and a motor nerve, and a combined sensory and motor nerve. For instance, about the head, where we have purely motor nerves and purely sensory nerves, it is almost impossible to keep a sensory nerve from uniting itself. It will get out, grow for inches, and repair itself; a sensory nerve, having a peripheral impulse toward the centre, seems to have active regeneration. A motor nerve in which the impulse comes from the centre out is slower to repair. For instance, I have taken out the infraorbital, plugged the opening with silver, and for as many as seven years there has been no return of sensation in that area, then a recurrence of pain; upon secondary operation the silver plug was found out of the foramen, the nerve which had been lying dormant for this length of time got out, hunted

up a partner, so to speak, and went to work. In the case of the motor nerve of the arm, where there are sensory and motor fibres, we will get more rapid regeneration because of the peripheral impulses, and as the sensory nerve of the arm is so much in excess over that of the leg, we will get earlier repair in the surgery of the nerves of the arm.

Dr. Horsley (closing).—As may be noticed by looking at the photograph, this patient was a young negro, with not a great amount of intelligence. He was evidently of a low, simple organization, so far as his nervous system was concerned. It is unquestionably true that the same law applies here that would apply to every similar case experimentally, namely, the lower the organism the more rapid and more complete the repair. It is very probable that if my patient had been a white man, with a higher type of organization, I should not have achieved as satisfactory a result as I did in this case.

There is one other point I wish to mention. I purposely avoided the use of the term nerve "grafting" because it seems somewhat vague. I noticed in looking over the literature that the word "graft" was used in two distinct senses: one in which an anastomosis is made and the peripheral end of the injured nerve is implanted into the side or end of a healthy nerve; in the other sense, it is used in those cases in which the defect of the nerve is bridged over by some foreign substance.

FOREIGN BODIES IN THE ŒSOPHAGUS.

By Stuart McGuire, M.D.,
Richmond, Va.

The frequency with which foreign bodies become lodged in the œsophagus and the varying conditions with which the surgeon has to deal make the subject one of practical interest. The accident is most often seen in the very young and in the insane. The foreign bodies are usually pins, coins, buttons, pieces of bone, or artificial teeth. The points of impaction are either the upper border of the cricoid cartilage, or where the œsophagus is crossed by the left bronchus or where it passes through the diaphragm. The symptoms are nausea, sensation of obstruction, pain on swallowing; sometimes hemorrhage and occasionally a reflex cough. In regard to prognosis the size of the foreign body is not as important as its shape. If large, it may produce complete obstruction, but this condition forces the victim to seek prompt relief. If irregular or sharp pointed the patient may be able to swallow soft food, and hence not recognize the urgency of the condition until ulceration of the œsophagal wall leads to perforation and the involvement of the pleura or mediastinum.

The diagnosis is based on the history of the case, external palpation of the neck, passage of an œsophageal bougie, and finally, and most conclusively, by the use of the *x*-ray. The character and location of the foreign body being determined the practical question is, How best to remove it. If it is round or smooth, efforts should be made to extract it

with forceps and probangs, or to make the patient eject it by swallowing masses of partially masticated food, and then vomiting. If it be small, it may seem wise to endeavor to push it into the stomach.

None of these expedients should be tried, however, when the foreign body is pointed, sharp or angular. Here, under modern surgical technique, an open operation is the safest procedure. There are two means of approach, by an external œsophagotomy and by a gastrotomy, and the selection of the method will depend on the location of the impaction. If it is opposite the cricoid cartilage, an esophagotomy should be done. If it is below the level of the supraclavicular notch, then gastrotomy should be performed. Bull, by the last-named method, successfully removed a peach-stone which had lodged in a child's œsophagus, six inches above the stomach. Richardson has demonstrated that in an adult, a foreign body which is found fourteen and one-half inches from the incisors is lodged at the cardiac end of the œsophagus, and if it is found at a distance of nine inches, it is at the arch of the aorta, a point of great danger, owing to the possibility of ulceration into the vessel.

As an illustration of the operations of œsophagotomy and gastrotomy, I desire to report briefly two cases.

Case I.—M. S., aged ten months, patient of C. D. Kunkel, of Pulaski, Va., June 1905. The child was playing with a glass stopper, put it in her mouth and swallowed it. It lodged in the œsophagus, opposite the cricoid cartilage and produced complete obstruction. When the patient was brought to me eight days after the accident she was in a pitiable condition from thirst and starvation. A throat specialist was called in consultation, but despite patient and skilful efforts he failed to remove it. It was then decided to do an external œsophagotomy. The patient was anæsthetized and a three-inch incision made on the left side of the neck, parallel with the anterior border of the sternomastoid muscle. The deep cervical fascia was exposed and divided. The thyroid gland

larynx, and trachea were pulled upward and forward and the large vessels outward, thus exposing the œsophagus. A large bougie was then passed to the point of obstruction and the œsophagus was then closed with two layers of catgut sutures, the external incision partially closed, gauze drainage being placed in its lower angle. As there were no septic complications present, it was deemed unnecessary to elevate the foot of the bed, as advised by Wyeth, to gravitate fluid away from the mediastinum. The patient was given an enema of saline solution and one of the preparations of predigested beef, but as thirst was almost intolerable, water was shortly given by mouth, and liquid food the following day. There was little discharge from the wound, and the patient was well at the end of two weeks.

The elaborate after-treatment described in most text-books for this operation seems to me to be unnecessary, if not injurious. Rectal alimentation is at best but a poor substitute for food by mouth, and the contact of sterile liquids with the incision in the œsophagus will do less harm than the mechanical injury incident to the passage of a stomach tube.

Case II.—L. K., aged seven months, patient of Dr. E. C. Fisher, of Richmond, Va., admitted to Virginia Hospital, July, 1904. The baby while being dressed seized an open safety pin and put it in his mouth. The mother, in her endeavor to remove it, pushed it first into the fauces and then into the œsophagus. The family physician and later a throat specialist made unsuccessful efforts to remove it with probangs. Five weeks after the accident the child was brought to the Virginia Hospital. He was feverish, emaciated, and evidently in constant pain. A skiagraph located the pin in the œsophagus, immediately behind the heart. The safety pin was open with the point up, and it was obviously impossible to remove it from above. It was therefore determined to do a gastrotomy and extract it from below. The patient was anæsthetized, the abdomen opened, stomach incised, and a finger inserted and carried through the cardiac openings.

At first the pin could not be reached, but by the use of an œsophageal bougie passed from below it was pushed into a position to be easily removed. The incision in the stomach was sutured and the abdomen closed. Recovery uncomplicated and child now in good health. The introduction of the finger into the lower end of the œsophagus impressed the close relationship of the heart. The shock produced by even the gentlest manipulations, made me determine if I had a similar case to endeavor to push the foreign body into the stomach before beginning the operation.

DISCUSSION.

Dr. J. Wesley Long, of Greensboro, North Carolina.—There is one comment I would like to make on this very interesting paper, and that is with reference to the indication for doing a gastrotomy and external œsophagotomy respectively. I understood Dr. McGuire to say, that if the foreign body be located below the level of the suprasternal notch that gastrotomy would be indicated in preference to an external œsophagotomy. In many instances this is probably correct, but I question the statement that the position of a foreign body below the suprasternal notch should be taken as an absolute indication for removing it by gastrotomy.

At the Richmond meeting of this Association in 1901, I read a paper with a similar title, "Foreign Bodies in the Œsophagus," and reported a number of cases, among them that of an infant, forty-six days old, with a safety pin lodged in its œsophagus opposite the fourth dorsal vertebra just where the left bronchus crosses. The open end of the safety pin was upward and a radiograph showed the point of the pin to be below the level of the arch of the aorta. Through an external œsophagotomy wound I was enabled without great difficulty to reach the head of the pin, the head was seized with forceps and by describing the arc of a circle, the point being delivered last, the pin was easily removed. The little patient, perhaps the youngest on whom an external œsophagotomy was ever performed, suffered very little if any shock, which was a prominent feature in Dr. McGuire's case, and made an uninterrupted recovery. There-

fore, while I agree with Dr. McGuire in the main, yet I believe there are some cases in which it would be preferable to resort to an external œsophagotomy.

Dr. W. S. Goldsmith, of Atlanta, Georgia.—My experience with foreign bodies in the œsophagus has been limited to one case, in which I saw fit to do gastrotomy for its removal, and in so doing followed the technique outlined by Dr. Bull, of New York, who originated a method of removing foreign bodies from the lower end of the œsophagus. The foreign body in this case consisted of the concave part of a dental plate, which had lodged in the œsophagus for a period of four months. The patient was extremely emaciated and very weak, so that it was not an ideal case to operate on. I located the foreign body, but could not grasp the concave body which surrounded the lumen of the œsophagus with forceps in such a way as to extract it. It then occurred to me to make use of the method described first by Dr. Bull of attaching a series of sponges to a long silk ligature, using an œsophageal bougie, passing it through the mouth, and leaving in position the series of sponges. After detaching the tube or bougie from the sponges, it was a simple matter by a few sweeping movements backward and forward to push this foreign body down into the stomach, and then its extraction was easy. I am sure that if I had attempted the technique of reaching this body with an instrument, it would have been impossible to have extracted it, but with the gentle resistance and elastic pressure that these sponges gave, I was enabled to push the foreign body down without any injury to the œsophagus. I think it is very essential for us to keep in mind all the time the probability of doing injury to the œsophageal wall by these foreign bodies. I knew exactly what I had to deal with in this case, although the *x*-ray revealed nothing. The foreign body was of such consistency that it did not give a shadow, and the *x*-ray was practically of no aid. After reaching the foreign body and trying to get it out, there was nothing that could effect its removal except this method of Bull. Dr. Bull removed a deep-seated peach-stone from the œsophagus by the same method, except that he swept it upward, and extracted it through the mouth. In my case the foreign body was extracted from the stomach as it passed down into that organ very easily.

Dr. H. A. Royster, of Raleigh, North Carolina.—I would like to report the case of a child, aged two years, who was brought into the hospital with a history that two weeks previously it had swallowed a wheel of a tin toy wagon. The condition of the child did not suggest anything serious, and the mother stated that it could swallow liquids, but not solids. During the presence of the foreign body the child lived mostly on milk and other liquid food. I applied a mouth gag and introduced a medium-sized shotted, semielastic bougie for the purpose of making an examination. As it went into the œsophagus it struck against something, after which it passed farther on. I then removed the bougie and in taking it out, I gave it a sudden pull, reached for a larger bougie, hoping to push it into the stomach, and with my finger in the mouth I found the foreign body at the base of the tongue and easily extracted it. The bougie impinged in one space between the spokes of the wheel and this was sufficient to bring it up by a sudden jerk. That space was not covered by mucus; the other three were deeply embedded in mucus. The facts were that the child had swallowed this wheel, and it had become lodged transversely across the œsophagus, there being a sufficient opening for the fluids to go through. It was extracted in exactly one minute and two seconds.

Dr. J. Shelton Horsley, of Richmond, Virginia.—I desire to emphasize a fact that has already been pointed out, namely, the great danger from delay in cases of foreign body in the œsophagus. If we find that we cannot extract the foreign body by ordinary means, we should operate as soon as possible. I recall a case I operated upon a year ago last summer, a child, who had swallowed one of the little camels from a grab-bag. The child put it in its mouth and swallowed it. The camel stuck in the œsophagus, a little lower than the level of the larynx. Attempts had been made to extract it by several different methods, but were unsuccessful. I saw the child on the fourth day, and did an external œsophagotomy, removing the foreign body without any difficulty. The œsophagus was macerated. The little patient did well for the first few days, then developed septic symptoms and died. That child's life would probably have been saved if I could have operated a little earlier.

Dr. Chas. M. Rosser, of Dallas, Texas.—I wish to report, briefly, two cases which occur to me just now. In one the

x-ray was used not only for the purpose of diagnosis, but was an aid in removing the foreign body. The case occurred two years ago, the patient having swallowed an ordinary pin, which lodged in the beginning of the œsophagus, turned crosswise and somewhat embedded. By means of the *x*-ray the pin was accurately located but attempts to remove it in the ordinary way were not successful. However, by using the fluoroscope, and having a throat specialist direct his instrument as he was told to do, we were able to remove the pin. The pin was two-thirds buried and in extracting it it was caught by the head and removed.

The second was that of a child four years of age from whom a nickel was removed. Having been swallowed it lodged within two or three inches of the cardiac end of the œsophagus. The *x*-ray demonstrated the location of the nickel. Opinions differed a little as to whether an operation should be done, or whether there should be an effort made to dislodge it. Preference was given to a gastrotomy. This operation was done; the patient lived for about six or eight hours, and then died without recovering from shock. My judgment then was that gentle dislodgment would be safer although in order to avoid complicating results from possible traumatism the other expedient was chosen.

Dr. Rufus B. Hall, of Cincinnati, Ohio.—While we are discussing the removal of foreign bodies from the œsophagus, I desire to briefly speak of a case which I think will be of interest to the members in this connection.

The daughter of a physician in Cincinnati, about five months old, swallowed a safety-pin an inch and a quarter long, which lodged in the œsophagus for a time supposedly, and then all symptoms of its presence disappeared at the end of twenty-four or thirty-six hours. The child was able to take the breast and thrived well, but the father and mother felt uneasy as to the condition of the child. An *x*-ray picture was taken and an open safety pin was found located at the pyloric end of the stomach. It was a beautiful skiagraph. An operation for the removal was discussed but not advised until unfavorable symptoms developed. There were several *x*-ray pictures made of this case. The child never had any unfavorable symptoms from the pin. The child continued to grow, and when it was

about twenty-six months old the pin passed by the natural route. She was at that time seven years of age.

Dr. W. D. Haggard, of Nashville, Tennessee.—I recall the case of an eighteen-months-old child who had swallowed a pin, the head of which was about as big as a cherry-seed. The child developed a cough, and the presumption was that the pin had lodged in a bronchus. An *x*-ray picture was taken but did not throw very much light upon the location of the foreign body, except that it appeared to be in a bronchus, with its head down and to the left. The pulmonary signs were so slight that he could not see his way clear to undertake an operation. A few days later another *x*-ray picture was taken, but the symptoms from the presence of the foreign body were so slight that an operation was deferred, believing that were he to act upon the disclosure of the *x*-ray in the absence of symptoms, it might lead to serious trouble afterward. Four days later another radiograph was taken, which did not disclose the pin, and at the end of several days from this time the pin was passed by the natural route.

Dr. McGuire (closing).—If there was any merit in my paper it was its brevity, and I, therefore, am much obliged to the members who have discussed it.

With reference to Dr. Long's question as to the proper method to adopt in cases requiring surgery, whether to do an œsophagotomy or gastrotomy, I will say that as far as I can see, we can lay down no hard-and-fast rule. Each case must be treated on its special indications. Of the two operations, I would personally rather do a gastrotomy than an œsophagotomy. It seems to me easier, and the after-treatment is simpler, and if it is equally applicable, I should say it is the method to be adopted.

The ingenious expedient of Dr. Bull, as described by Dr. Goldsmith, is one that I have not seen in the literature on the subject.

The "sixty-two second" method used by my friend, Dr. Royster, in the case he reported seems to me to be attended with considerable danger, and in my opinion ought not to be recommended.

GALLSTONES IN THE CYSTIC DUCT.

By L. H. Dunning, M.D.,
Indianapolis, Ind.

This brief paper was written for the purpose of presenting to this Association an account of a method which I have employed in one case which greatly facilitated the pressing backward into the gall-bladder of a stone impacted in the cystic duct. Before describing the method it seems to me proper to briefly consider the indication for the employment of cholecystotomy in cases of gallstones in the gall-bladder and cystic duct. This seems the more appropriate at this time, by reason of the unsettled condition of the views and practice amongst our great operators relative to the methods in such cases.

There is no question occupying the attention of the surgeon to day of greater interest or of more vital importance than that of drainage in gall-bladder and bile-duct cases.

Which is the best method, and what are the indications for each, gall-bladder, cystic duct or hepatic duct drainages. After a diligent study of all records of experience of a considerable number of our great operators, I am forced to the belief that we have not yet reached the point of gall-bladder surgery, where a positive answer can be given to either one of these questions. It seems to me to be a conviction, pretty generally shared by our most experienced operators, that some form of drainage yields the best results in the vast majority of cases, but there is a distinctly marked lack of uniformity in the choice of methods.

There is, however, one point of agreement. It is, in case

of closure of the cystic duct or marked stricture of the same with inflammation and thickening of its walls, it is useless to rely upon the gall-bladder as a way of drainage of the hepatic ducts. So that such a closure or imminence of closure has come to be considered an almost absolute indication for cholecystectomy. Probably, the only cases in which cholecystectomy would be considered as not indicated, would be those in which there was infection of the gall-bladder, and a condition of the patient such as to demand the simplest possible procedure for relief. Then the procedure is cholecystotomy in one or two stages and cholecystectomy later, if necessary.

What shall be done in gallstone cases where the stones are confined to the gall-bladder and cystic duct, with the latter permeable, and all other ducts clear?

In the light of my present information, I should answer this question by saying, cholecystotomy and gall-bladder drainage. There may be some exceptions to this rule, such as the presence of changes in the gall-bladder, such as to lead the operator to fear the later development of cancer, or such a thickened contracted condition of the gall-bladder, as to render this organ difficult of drainage, and if drained, of small use because of its smallness and the lack of elasticity of its walls.

My reason for holding decided views relative to the superiority of cholecystotomy to cholecystectomy in the class of cases we are considering is the following:

Cholecystotomy is more in accord with the designs of nature in the construction of the gall-bladder and bile ducts system. To be sure, the purpose of the gall-bladder has not been made entirely clear to our minds, but this fact seems indisputable, viz., that under normal conditions, the bile flows freely into and out of the gall-bladder. The gall-bladder is capable of becoming, and undoubtedly does become a receptaculum for bile and thus, at times, relieves undue pressure in the ducts and duct terminals.

If this be true the gall-bladder serves a useful purpose and should be retained unless the safety of the patient demands its removal and facts seem to conclusively show, that in the class of cases under discussion the safety of the patients does not demand the removal of the gall-bladder.

Not only is it desirable to drain through the gall-bladder, and to leave this organ as a part of the bile system, but also the statistics of our most experienced operators show beyond a question, that in suitable cases the mortality of cholecystotomy is considerably less than the mortality of cholecystectomy.

A few statistics may be quoted as substantiating this statement. Kehr's[1] latest report shows the following rate of mortality for the two methods.

1. Conservative operations (cholecystotomy, cystendisis, and cysticotomy), 275 cases, five deaths, 1.8 per cent.

2. Cholecystectomy, 220 cases, seven deaths, 3.2 per cent.

In a previous paper,[2] he gives a table of operations done within a certain period, and in this table are mentioned: 20 cystotomies, no deaths; 15 cystectomies, one death.

In the abstract[3] from his paper, from which I am quoting, Dr. Kehr is made to say, that he removes the gall-bladder when this does not appreciably increase the risk of the operation.

In another abstract of the same paper, I find that Kehr prefers cholecystotomy in all acute cases. In interval operations he believes the gall-bladder should be extirpated.

If he is correctly quoted, we must conclude that in the (acute) cases, many of which are most dangerous, he does cholecystotomy with a mortality of 1.8 per cent., while in the less dangerous (interval) cases he does cholecystectomy with a mortality of 3.2 per cent.

Mayo Robson[4] in the third edition of his work shows conclusively the greater mortality of cholecystectomy.

[1] British Medical Journal, July 22, 1905, pp. 191-192.
[2] Ibid., October 22, 1904, p. 109. [3] Ibid.
[4] Annals of Surgery, vol. xxxviii. pp. 5 to 8.

He says: Where the operation of cholecystotomy has been undertaken for cystic diseases, such a gall-bladder in the absence of cancer, and jaundice with suppurative or infective cholangitis, the mortality has only been 1.06 per cent.

If the complicated cases such as phlegmonous cholecystitis, gangrene of the gall-bladder, suppurative and infective cholangitis (all of which are classified by Kehr as complicated cases) be included, the mortality has been 2.7 per cent.

Where cholecystectomy has been performed for diseases other than malignant, the mortality has been 6.2 per cent.

The Mayo[1] statistics show there were 573 cholecystotomies with a mortality of 2.46 per cent, 186 cholecystectomies with a mortality of 4.3 per cent.

Mayo states that the acute cases were nearly always drained by cholecystotomy.

These statistics speak unmistakably for cholecystotomy in suitable cases. After stating the above statistics of their operations, Mayo in his characteristic, clear and concise method proceeds to state: "Inasmuch as in not a single instance, did stones reform in the gall-bladder when left behind, cholecystotomy must be considered the safe operation, cholecystectomy being reserved for certain cases in which cholecystotomy may be expected to furnish in a considerable proportion of cases, a partial or complete failure."

This statement, I believe, will stand the test of time and experience and will be the test the surgeon will apply in choosing between cholecystotomy and cholecystectomy in gallstone cases, in which the gallstones are confined to the gall-bladder and cystic ducts, with the latter patulous and hepatic and common ducts clear. The best test of the patulency of the cystic duct is the presence of a considerable amount of bile in the gall-bladder.

If the bile be clear and fluid, the proof may be considered positive, and if considerable, even of dark color, and mixed

[1] Transactions of the Southern Surgical and Gynecological Association, 1894

with ropy mucus, it is nearly as positive proof, but if the bile be of small quantity, thick and ropy, or if it be inspissated, it is safer to deal with the case as one of bile stasis, and one in which gall-bladder drainage will be insufficient.

The means successfully employed for clearing the cystic duct of a stone or stones have been:

(*a*) By gentle manipulation by finger pressure, forcing the stone backward into the gall-bladder.

(*b*) In case the stone is lodged in the cystic duct, in front of a stricture of smaller calibre than the transverse diameter of the stone, the stone has been crushed and the fragments forced backward, and into the gall-bladder, the stone has been broken by needling, and the fragments forced backward, the stricture has been dilated by forceps, which have been carried through the incision in the gall-bladder, and through the stricture separating the cavity of the gall-bladder and the duct, and then by opening the forceps the stricture has been dilated to a size sufficient to enable the stone to pass through the stricture into the gall-bladder. Sometimes the finger tip has been made to enter the stricture and by pressure dilate it to a sufficient size to allow the passage of the stone.

(*c*) Incision of the cystic duct, delivery of the stone through the incision, and finally stitching the incision has been practised of late.

The procedure which I employed in one case and the history of which I herewith submit, is a very simple one, and seems to me a feasible one alsc

The gallstone was lodged in the cystic duct in front of a small stricture. After making all the effort I deemed prudent to press the stone backward into the gall-bladder without success, I then unsuccessfully attempted to dilate the stricture with the finger tip and later with forceps. One of the assistants suggested that he thought we could better dilate with the forceps, if we could see the stricture. The walls of the gall-bladder were elastic. The liver had been turned upward

so the gall-bladder was near the surface. The opening in the gall-bladder through which we had been working was enlarged a little, and then the stone was steadied and held against the stricture by an assistant. The fundus of the gall-bladder was pushed forward toward the strictured entrance into the cystic duct. We so far succeeded as to bring the opening in the wall of the gall-bladder directly opposite the strictured opening. We then tried to introduce the forceps' tips, but failed.

Picking up a pair of probe-pointed scissors, curved on the flat, the point was gently worked through the fistula, and the scissors opened; this did not dilate the opening sufficiently, so the edge of the fistulous ring was snipped slightly in two or three places, when we were able to dilate the fistula so as to permit the easy exit of the stone. Our operation was completed in the usual way. A rubber tube was fastened in the gall-bladder and that viscus anchored to the fascia. Before we had finished our operation, it was easily apparent that a little bile had flowed into the gall-bladder.

Two or three ounces of bile were discharged from the tube daily. At first, it was dark and thick, but gradually approached the normal color and consistency.

The patient made an uneventful recovery, and has had but little further pain or soreness in the gall-bladder region.

It seemed to me that the procedure we adopted in this case may be found of service in others. It is not applicable of course, to cases in which the gall-bladder cannot be brought near the surface or where the gall-bladder is thickened by inflammatory deposits.

Mayo Robson quotes a case on p. 256 of the third edition of his book in which, it would have been particularly applicable. The steps in the procedure are:

1. Pull down and rotate the liver by the method of Robson.

2. After emptying the gall-bladder, if thought advisable, enlarge the opening in the fundus.

3. Let an assistant, gently but firmly, hold the stone

against the small opening between the gall-bladder and the cystic duct.

4. Bring the two openings, *i. e.*, the one in the fundus of the gall-bladder and the one leading into the cystic duct, directly opposite, the walls upon either side lying in close contact.

5. Snip, if necessary, slightly the edges of the ring surrounding the cystic duct opening, dilate the opening with forceps tips or the blades of a blunt-pointed scissors curved on the flat.

6. Complete the cholecystotomy in the usual manner.

In the writer's experience, in operating upon ninety-three cases of gallstones, there have been ten cases of stone in the cystic duct requiring considerable effort to dislodge them. In two of the cases, early in his experience, the stones were crushed and portions left behind, subsequently, giving so much trouble that cholecystectomy was finally performed.

If one studies Mayo Robson's tables of cholecystotomies, he will be struck by the frequency with which he was compelled to crush the cystic duct stone.

Robson's[1] case No. 259, we have an example of a case to which the method above described would have been applicable.

Case 259. Empyema of the gall-bladder, cystodochotomy and drainage recovery.

Mrs. G., aged forty-seven years, seen with Dr. L. Forley. Repeated gallstone seizure for two years; no jaundice; no fever; distended and tender gall-bladder.

Operation March 23, 1894. Empyema of gall-cyst with many small stones in the gall-bladder; one large impacted stone, which could not be dislodged from within, was removed from the cystic duct by direct incision; drainage of the gall-bladder and gauze drain down to sutured incision in duct. Good recovery. Well in 1901.

In this case the method of multiple slight incisions and

[1] Gall-bladder and Bile Ducts, p. 256.

dilatation of the strictured opening into the cystic duct could have been accomplished with the greatest ease.

It is probable that, in many cases, no snipping of the ring of tissue surrounding the opening will be required, dilatation being sufficient.

The history of my case, in which the procedure is already described, is as follows, viz.: Case VII. Mrs. Y., referred by Dr. Hester, of Bloomingdale, Indiana, June, 1905. She presented a long history of repeated attacks of gallstone colic. She was emaciated and quite ill when she came to the hospital. Her suffering and ill health were aggravated by the presence of retroverted uterus and prolapsed and inflamed adnexa, so that at the urgent solicitation of herself and physician the operation began as a verito-suspension and removal of the adnexa. The usual gallstone operation followed. The gall-bladder contained a considerable quantity of dark-colored bile and several gallstones. One stone was incarcerated in the cystic duct. No stones in the common duct. The stone in the cystic duct was slightly movable, but the opening into the duct, from the gall-bladder was very small and tight. I attempted to dilate the opening, with the finger tip, and later with forceps, all to no purpose. I then attempted, by passing a large needle through the opening, and into the stone to fracture it, but this was unsuccessful, finally, the method heretofore described was adopted with success. The gall-bladder was drained with a large rubber tube.

Bile drained away from the first. It was first dark and thick, and gradually thinned and became nearly normal. With the exception of an infective abscess in the lower wound the patient made an ideal recovery. The biliary fistula closed in six weeks. The patient regained her health.

COMMON DUCT OBSTRUCTION.

By John Wesley Long, M.D.,
Greensboro, N. C.

Obstruction of the common duct bears about the same relation to stones in the gall-bladder as does general peritonitis to catarrhal appendicitis. The one is a simple affection *per se* and easily remedied by a safe operation, while the other is a serious condition, always accompanied by grave complications, and any operation undertaken for its relief is never free from danger. This statement is amply borne out by the statistics from the Mayo clinic, as yet unpublished, which I quote by permission.

The Mayos have done 1325 gallstone operations, of which 646 were for simple stones in the gall-bladder without marked complications with a mortality of less than 0.5 per cent.; while in their operations for common duct obstruction by stones they have had 177 cases, with a mortality of 11.9 per cent, and of malignant growths of the common duct 10 cases, with 40 per cent. mortality.

These facts should forever settle the question as to the propriety of operating while the stones are still in the gall-bladder and the case free from serious complications, and I trust this Association will not fail to endorse this view of the matter.

Common duct obstruction is produced by a variety of conditions, but the chief cause is the presence of stones. The next most frequent cause is malignant growths, and they are so nearly always caused by the irritating presence of

stones, that when all has been said relative to stones the tale has about been told.

This Association had held two annual meetings before Marcy did the first successful choledochotomy, hence, we are not discussing ancient history but a modern surgical procedure, to which no one has contributed more than has this learned body.

It is perhaps true that gallstones may remain in the gall-bladder a long time without causing symptoms, but when they journey down into the common duct they generally make their presence known. And I believe a careful inquiry into the history would elicit evidence of the presence of the stones in the vast majority of instances while yet in the bladder. Once in the common duct a train of vicious complications is set in motion that is only terminated bv the passage of the stone or an operation.

In common duct obstruction infection is already present, since the stones do not begin to form in their natural habitat, the gall-bladder, till infection has taken place. This primary infection probably comes through the presence of bacteria screened out of the blood by the liver cells. Even though the original infection be long since gone, Sherrington has shown that the moment obstruction of the common duct occurs there is an instantaneous invasion of colon bacilli from the duodenum. Infection in the gall-bladder produces but little constitutional symptoms because of the absence of glands, but the common duct is bountifully supplied with lymphatics, therefore septic matter is quickly absorbed, producing a chill and characteristic "steeple" temperature curve of a common duct infection. An infectious cholangitis, of course, leads to dire consequences. Added to the absorption is the invasion of the liver along the hepatic ducts and of the surrounding peritoneum. I have seen two patients die from peritonitis due to common duct obstruction without operation. Robson gives a list of twenty-seven distinct conditions or complications that may result from common duct obstruc-

tion, but even an enumeration of them would be out of place.

The distinct symptoms of common duct stones are the colic, the intermittent jaundice, the absence of tumor, and the ague-like paroxysms. Jaundice is not always present, but certainly the rule must ever be that in acute obstruction there is jaundice. Unless the stone be impacted the jaundice is intermittent, with a tendency to deepen after each exacerbation of symptoms. There is rarely a tumor unless the cystic duct be also blocked. The chill is rather a rigor, and the temperature goes up rapidly and drops quickly. The pain is not so severe as is cystic duct pain and is nearer the middle line.

The treatment of common duct obstruction can never be anything other than surgical. Each case must necessarily be in a measure a law unto itself, but there are certain principles that have been quite firmly established. After the removal of a common duct stone the first essential is drainage. No operation on the common duct can be considered safe that does not provide for drainage, either directly from the duct or from the outside. In some of my cases I have been able to close the opening in the duct but never the abdomen without drainage.

It is also imperative that the patency of the choledochoduodenal opening be assured, otherwise we will have a permanent biliary fistula.

If the obstruction be irremovable, as in malignancy with extensive involvement, then a cholecystenterostomy should be done.

Another problem which confronts us in the management of common duct cases is, what disposition shall we make of the gall-bladder? Shall it be removed or drained? When stones are removed from the gall-bladder they rarely reform as is shown by Mayo's experience of over 1300 cases with reformation of stones only one time. This is not so univer-

sally true in common duct cases, since the same operators had stones to reform five times in 177 cases. It may be assumed that while stones never form primarily in the common duct, yet once there the diseased mucosa may invite the formation of others. It is therefore essential that the gall-bladder be utilized for drainage in common duct cases. The following are illustrative cases:

Mrs. B., aged forty-one years, married, and the mother of a large family. She gives a history of acute cholecystitis eighteen years before her present attack. The writer attended her during her former illness. After this her health was perfect until about six months prior to the time of her operation, when she began to have attacks of colic in the common duct region. These attacks recurred with increasing frequency and severity, and were always followed by transient jaundice. After a little while the attacks were accompanied by a rigor and a sharp rise of temperature, often as much as 105°, which would in a few hours drop to normal. The patient became markedly emaciated and anæmic.

At operation the gall-bladder was found full of stones and pus but contained no bile. A cholecystectomy was done. There was one stone in the third portion of the common duct. Fortunately I was able to strip this stone backward and remove it by dilating the stump of the cystic duct and expressing the stone through it. The cystic duct opening was closed and ample drainage provided. The patient made a quick recovery and is now in perfect health.

It was noticed that the head of the pancreas was enlarged and very hard, evidently a chronic pancreatitis due to the stone having been lodged in the ampulla of Vater, causing an obstruction of the duct of Wirsung. Opie has pointed out how this may occur.

Mrs. T., aged forty-four years, has suffered for ten years with gallstone colic, with frequent attacks of local peritonitis

and sepsis. For more than a year the jaundice had not wholly disappeared and became very intense at times.

On opening the abdomen I found extensive and dense adhesions binding the gall-bladder, ducts, stomach and duodenum together. The gall-bladder contained no fluid but held a square stone measuring a half-inch on each facet. There was a large opening through the side of the gall-bladder communicating with a similar opening in the common duct, through which three other stones the same size and shape of the one in the bladder had escaped. They had literally ulcerated their way into the common duct, which was as large as one's thumb. These stones were packed snugly in the lower end of the common duct, but were easily pressed backward and made to emerge at the hole through which they had entered. Drains were applied through the bladder and around the ducts. A quick recovery followed. This is the only instance that I can find in which a stone had escaped through the side of the gall-bladder and into the common duct except a report by Schloth and quoted by Moynihan in his book on gallstones.

Another interesting case is that of a married lady, Mrs. C., aged fifty-six years, who had her first attack of colic when a girl. She had no recurrence until after she had borne several children, when the attacks came on with the usual history of increasing frequency and severity. At the time I first saw her she was *in extremis*, emaciated, septic, and jaundiced. Although the history pointed to the presence of gallstones in both bladder and common duct, yet her condition was so desperate that I dared do nothing more than hurried cholecystostomy and drain. The stone removed from the gall-bladder was the size of a small guinea-egg. This woman made a rather slow recovery, but after a number of months was able to do her household work and looked and felt as well as she ever did, despite the constant escape of bile through the fistula. Indeed she was so well that it was two years before she returned for treatment.

At the second operation I removed a stone from the first portion of the common duct, closed the opening in the duct and drained through the gall-bladder and around the ducts. The patient made a quick recovery and the biliary fistula soon closed spontaneously.

GANGRENE OF THE GALL-BLADDER.

RUPTURE OF THE COMMON DUCT; A NEW SIGN.

By Joseph Ransohoff, M.D., F.R.C.S.,
Cincinnati, Ohio.

In 1879 I had the privilege to report my first gallstone operation to the American Medical Association. In the intervening years the surgery of the gall-bladder and bile ducts has been so far developed that individual case reports have no place in our overburdened literature unless as by their aggregated number they might add weight to some general principle involved in the choice of and time for operation, or throw some light on the causes of death in seemingly simple cases. The two case reports I beg to submit do not belong to either category, but their comparative rarity must serve as an excuse for presenting them.

GANGRENE OF THE GALL-BLADDER.

A. B., male, aged twenty-one years, was admitted to Jewish Hospital June 25, 1905. The patient, whose father and mother are both living, has never to his knowledge been ill except for a pneumonia four years before the onset of the present trouble. Three days before admission he was taken with very violent pain in the lower part of the abdomen. He attributed it to rather free indulgence in beer, which he vomited after ingesting it. Four hours after the beginning of the symptoms the physician who was summoned admin-

istered morphine hypodermically for the relief of the pain, which had become intolerable. Ice bags were ordered and applied continuously. Although the starvation treatment had been rigidly carried out, the vomiting continued at frequent intervals, except when the patient was under the influence of morphine. The diagnosis of appendicitis had been made and operation advised within twenty-four hours of the beginning of the attack. The bowels have been moved by enemata.

Condition on Admission. Well developed and well nourished male. Temperature 100° plus, pulse fluctuates between 100 and 120. The patient has a very anxious facial expression and vomits frequently large quantities of bile-tinged fluid. The tongue is dry and heavily coated. The abdomen is very much distended with marked muscular rigidity on the right side. Percussion shows excessive tympany which has pushed the liver dulness upward. Although the entire right side of the abdomen is tender to the touch, the tenderness seems most acute in the lower quadrant and in the loin. The blood count shows a leukocytosis of 31,600 whites.

Diagnosis. Acute appendicitis with gangrene probable. Immediate operation. Incision through right rectus. When the peritoneum was opened a considerable quantity of turbid serum escaped. The coils of distended and congested intestine presented in the wound covered in many places with flakes of whitish lymph. They were held aside with considerable difficulty. The appendix was readily brought into view and removed. While it presented evidence of inflammation like the coils of intestine about, there were no adhesions and no sign of perforation. It seemed evident that it was not the source of the peritonitis. The incision was, therefore, elongated for better exploration.

There was easily revealed a tensely distended gall-bladder of a uniform color that was almost black and without any lustre. This appearance of the gall-bladder could be seen through the large wound to extend to the very neck. The

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examination was made easy by the absence of adhesions either recent or old. Before determining to open the gall-bladder, as is my invariable custom, the common duct was carefully palpated for a stone or other tangible cause of obstruction, but none was found. After carefully protecting the intestine with aprons, the gall-bladder was incised and about ten ounces of ropy viscid bile mixed with blood clots, were removed. There was no pus. The vesical contents were free of odor, and a number of cultures on agar agar and blood serum made. All remained sterile. Most careful exploration of the gall-bladder failed to reveal either a stone or biliary sand. The operation was completed as an ordinary cystotomy with the exception that enough gauze packing was inserted about the gall-bladder to protect the general peritoneum from a new infection from the sloughing process which was sure to ensue. After thorough toilet of the abdomen, the lower part of the wound was closed by layer sutures.

The operation left the patient with a pulse of 150. Nevertheless, the recovery was rather rapid. Vomiting ceased at once. For ten days the temperature fluctuated between 101° and 103°, when it and the pulse rate returned gradually to the normal. On the third day after the operation the dressings were saturated with bile. It did not come through the intravesical drainage tube. Five weeks after the operation the gall-bladder was removed almost *en masse* from the wound. The black slough shows the various coats quite down to the cystic duct. After the expulsion of the gangrenous mass the biliary fistula healed rapidly. The patient left the hospital September 3d. He has since regained full health and weight. The wound is solidly closed.

RUPTURE OF THE COMMON DUCT WITH AN UNUSUAL SIGN.

For the following history I am indebted to Dr. J. E. Greiwe, who referred the case to me for operation: W. B., aged fifty-three years, occupation merchant; residence city. Mother

died at the age of eighty-four; cause of death "old age." Father died at the age of sixty-five from cancer of the stomach. One sister died at the age of forty-eight of cancer of the breast. One brother died in infancy, cause unknown. Four brothers living, one now suffering from locomotor ataxia. Another of the brothers at the age of six had an attack of infantile cerebral palsy. Two sisters living and well.

Patient claims not to have had the ordinary diseases of childhood, in fact not to have been ill until six years ago, when he passed through a moderately severe attack of typhoid fever from which he made an apparently perfect recovery. In April of this year he had what appeared to be a very mild case of acute indigestion lasting not longer than twelve hours. At that time he had no fever, no vomiting, and considered himself perfectly well on the following day On August 19th, of this year, while on a vacation at Prince Edward's Island, he was seized with severe sharp, colicky pains which he located in the region of the umbilicus. The pain began at 11 P.M. after he had retired and continued to be severe all night and was partially relieved by the use of an enema on the following morning. He was seen by his physician the next day, who pronounced the attack one of acute indigestion, ordered a dose of castor oil which secured a very free movement of the bowels. The pains, however, continued becoming less and less intense and disappeared after four or five days, during which time he remained on a restricted diet. There was neither fever nor chill during this attack, nor was the patient at any time jaundiced. From that time until the onset of the present trouble, October 21, 1905, the patient considered himself absolutely well, attending to his business and enjoying perfect health. Even on the morning and afternoon of the day when the trouble began, the patient performed his usual duties about the office, the attack coming on suddenly at 6.30 P.M., beginning with a severe chill which lasted about twenty minutes. I saw the patient a half-

hour after the chill had subsided. He was resting in bed and seemed fairly comfortable, except for a slight uneasiness, not a severe pain, in the upper right quadrant of the abdomen. Pulse and temperature were normal, no nausea, no vomiting. The bowels had acted freely early in the morning. An examination of the abdomen revealed a tenderness but very little rigidity in the right hypochondrium. The region of the ileocæcal valve was absolutely free from pain and tenderness. The abdominal walls were very soft and relaxed. The patient was requested to remain in bed, to be given nothing except a dose of Carlsbad salt early on the following morning. During the night the pains in the right hypochondrium became more severe, and when seen early in the morning there was some slight rigidity of the abdominal wall in this region. The Carlsbad salt had been rejected by the stomach. Pulse 76, temperature 99°. Region of ileocæcal valve free from pain and tenderness. During the day he was seen at frequent intervals, and on account of the severity of the pain, which was sharp and cutting in character and now equally distributed over the whole right side of the abdomen, patient was given hypodermic injections of morphine. During the day the pulse and temperature taken at intervals of every three hours ranged between 76 and 92, temperature 99.1° to 99.4°, the pulse being full and regular. An examination of the thoracic organs revealed heart and lungs in good condition. The urine was high colored, acid, specific gravity 1024, with a trace of albumin, no sugar, and a slight trace of indican. The abdomen became very much distended, decidedly tympanitic, and no bowel movement was obtained in spite of repeated lavage of the colon. The patient suffered excruciating pains, which were now localized very definitely on the right, with the seat of the greatest intensity over the lower right quadrant of the abdomen. Exquisite tenderness over McBurney's point. Again during the night the patient had repeated

injections of morphine to relieve the pain. All efforts to obtain an evacuation of the bowels during the night and following day were unsuccessful. On Saturday the distention of the abdomen continued extremely tympanitic over all, pain and tenderness most marked on the right side and particularly over McBurney's point. No dulness on percussion over this area. After this the patient referred all his pain to the lower right quadrant of the abdomen. The temperature at no time on Saturday rose above 99.1°, the pulse varying from 88 to 96. At 9 P.M. the bowels were washed out with an enema consisting of warm watery glycerin and Epsom salts, producing an evacuation of mucus, which was slightly bile-tinged and which had a distinctly fecal odor. After this evacuation of the bowels the patient rested somewhat easier, but at 3 A.M. I was again called to see him. The pains in the right lower quadrant of the abdomen having become very intense, required the injection of a half-grain of morphine. There was a distinct change in the facial expression of the patient, the breathing had become shallow and rapid, the pulse small, easily compressible, and irregular. The abdomen more distended and very tender on pressure on the right side low down. Very little tenderness to pressure over the region of the gall-bladder. It was evident from the severity of the peritonitis and the extreme distention and the changes in character of the pulse and respiration that the time for an abdominal section had come. The patient at no time had been jaundiced, and it was left for the operator to determine the nature of the peritoneal inflammation.

Condition on Admission to Hospital. Large-framed man with every indication of intestinal obstruction from peritonitis, facial expression anxious, pulse about 130, temperature 100°. Examination of abdomen revealed extreme tympany with the liver dulness very much pushed up and reduced in area. On inspection of the abdomen attention was called to a marked jaundice of the umbilicus. The navel was of a

distinct, saffron-yellow color in strong contrast with the rest of the skin over the abdomen. It was the only evidence of jaundice. Tenderness extremely marked over McBurney's point. Probable diagnosis: Peritonitis of appendicular region.

Operation. Gas-ether anæsthesia. Incision through outer border of right rectus muscle. When the subperitoneal fat was reached it was found markedly tinged with yellow. With the opening of the peritoneum there poured forth a quart or more of free bile mixed with serum. The coils of the small intestine were loosely agglutinated and in many places covered with shreds of lymph. It being evident that we had to deal with a rupture of either the gall-bladder or one of the bile ducts, the incision was rapidly elongated. The gall-bladder was found quite empty and retracted under the liver. It could readily be traced to the cystic duct and neither in the latter nor in the gall-bladder was there any sign of inflammation beyond the general redness which appeared everywhere on the peritoneal surfaces exposed. The gall-bladder did not seem particularly thickened. After thoroughly removing with gauze sponges the free bile in the peritoneal cavity, it was evident that the flow of bile continued from the aperture behind the gastrohepatic ligament. The fat in the great omentum was very deeply stained with bile. By thoroughly holding the latter aside and pressing the viscera with gauze aprons to the left a tear could be felt in the posterior wall of the common duct through which the bile without question had escaped. The tear admitted the end of the little finger and was in the supra-duodenal part of the common duct. It could not be brought into view. As careful a search as possible was made for a stone but none was found. The condition of the patient did not warrant unnecessary prolongation of the operation. This was completed by making a stab puncture through the loin and inserting through it a half-inch drainage tube. A second tube was inserted to the anterior surface of the gastrohepatic ligament and a

third in the lowest angle of the wound. About them considerable packing was placed. The flow of the bile from the posterior tube was very free for three or four days, from which time on it gradually became less and ceased altogether in ten days. From this time on the recovery was uneventful.

Remarks. Although the cases presented differ in many important points, they have enough factors in common to warrant their consideration together. In the first place, in each of them a rapidly developing peritonitis made an operation absolutely imperative as an *indicatio vitalis*. In each of the cases the operation revealed a condition which to the naked eye, at least, had all the earmarks of a peritonitis, which might speedily cause death. In one of the cases there was an unruptured but gangrenous gall-bladder, the contents of which were proved to be sterile; in the other free bile in large quantities in the peritoneum. Unfortunately, in this case, cultures were not made, but the gall-bladder appeared normal. Since the reports of Naunyn, Hayen, Arbuthnot, Lane and others, which appeared some fifteen years ago, it has become the vogue to look upon normal bile as a rather inoffensive agent when thrown into the peritoneum and experiments in animals have often been made, notably by Erhart, to bear out this view. That bile has a tendency to destroy the virulence of the bacteria with which it comes in contact has been fully established, and this doubtless explains the fact that the peritonitis consequent on lesions of the biliary ways is less likely to be rapidly generalized and fatal than is perforation from other causes, such as appendicitis. The tendency to the formation of protective adhesions is greater, perhaps, also because of the natural diaphragm, of which the colon is arch and the mesentery form between the biliary ways and the general peritoneal cavity below. Abscess formation and even spontaneous recovery are, therefore, not uncommon. It appears that even postoperative results are excellent. Neck has collected eleven cases, chiefly from German sources,

of spontaneous rupture of the gall-bladder containing stones, with eight recoveries. On the other hand, Korte has seen nine cases of which five were beyond operative help. Of four cases operated on two recovered. In the fatal cases, death resulted between the third and tenth days. Moynihan and Mayo Robson cite a number of cases in which death resulted from uncomplicated wounds or tears in the biliary ways. It is not safe, therefore, to regard the bile as too innocuous an agent when poured into the free peritoneum. Hahn has recently collected seven cases of rupture of the choledochus of traumatic origin, all of which died with one exception. In the case of rupture of the common duct reported, it is more than likely that it resulted from the impaction of a stone. That none was found at the operation, does not militate against this theory in view of the previous history of the case. Just when the rupture took place it is impossible to state, but probably not later than thirty-six hours after the onset of the symptoms.

Regarding the diagnosis in the cases presented it must be regretted that as to the cause of the existing peritonitis a correct diagnosis was not made. In the case of gangrene, one of appendicitis was positively made and in that of rupture of the common duct it seemed probable that a perforated appendix would be found. The age of the patient and the history of previous attacks of indigestion and of severe colic made us think of the gall-bladder as the source of the peritonitis, but concentration of the tenderness in the lower quadrant of the abdomen made it probable that an appendicitis was present. Both cases emphasize the fact that in the presence of peritonitis a doubt as to its source makes for rather than against the advisability of an operation.

I wish here to call attention to a sign which was adverted to in the case of ruptured duct before the incision was made, and one to which I believe attention has never before been directed. It is the localized jaundice of the umbilicus. Although a single case is not usually sufficient to warrant the

assumption that something new has been observed, this feature was so marked that I cannot refrain from believing that further observation will give to this localized jaundice some value as a sign of free bile in the peritoneal cavity. In the case presented, this feature gained in interest as the staining of the subperitoneal fat with bile was observed in the incision through the abdominal wall. The jaundice is doubtless purely the result of imbibition. It makes itself manifest, first in the integument of the navel, because this part is thinner than the rest of the abdominal wall. It is possible, of course, that by reason of the anatomical relations of the round ligament of the liver to the transverse fissure there is a retrograde flow of bile through the lymphatics toward the navel, just as the caput medusæ is produced in cirrhosis.

Total gangrene of the gall-bladder has to my knowledge not been observed except in the case presented as an affection independent of gallstones. Altogether, total gangrene of the gall-bladder is a rare condition. Kehr and Korte do not mention it as an independent affection. Czerny describes two cases of gangrenous cholecystitis due to impaction of a stone in the cystic duct. Both cases were operated upon, one successfully. Czerny ascribes the gangrene to pressure on the cystic artery, which except for a very insignificant anastomosis along the attached surface of the gall-bladder is practically an end artery. In both cases of Czerny's the symptoms were those of intestinal obstruction The gangrene was limited to the mucosa of the gall-bladder. In 1894, Hotchkiss found a gangrenous gall-bladder by operation twenty-four hours after the onset of symptoms; a large stone was impacted in the cystic duct. No cultures were made. The patient died. Ferguson reports a case of gangrene operated on the thirteenth day. Many stones were found. The contents of the gall-bladder were sterile. Five weeks after the operation most of the gall-bladder came away as a slough through a fistula.

In the case above reported, a most careful search failed

to reveal the presence of a stone. Moynihan reports a case in which gangrene followed the involvement of the hepatic artery in a carcinoma of the pancreas. The etiology of the case above reported is far from clear. There was no infection of the gall-bladder at any time, at least not by aerobic bacteria. I believe that the gangrene resulted from occlusion of the cystic artery, although the manner of its obstruction must ever remain a matter of speculation. That it resulted from the excessive vomiting which marked the onset of the attack is more than probable. I am inclined to believe that by reason of this vomiting there was a twist in the neck of the gall-bladder, which involved the patulousness of both the cystic duct and artery. Theorizing may be vain and even unprofitable, but it rarely lacks interest.

DISCUSSION ON THE PAPERS OF DRS. DUNNING, LONG AND RANSOHOFF.

Dr. Charles H. Mayo, of Rochester, Minnesota.—I think Dr. Long's comparison of gall-bladder surgery with the old surgery of appendicitis is very appropriate. No surgeon to-day could secure operative work if he had a mortality in appendicitis work that he reported ten years ago. When we consider the fact that the mortality of gallstone conditions is less than one-half per cent., when the disease is confined to the gall-bladder, it means that it is almost an accident to lose a case without some unexpected complication. It is about the same, possibly not quite so much so, with reference to cases of interval appendicitis. The physician who brings to us, now, a patient with appendicitis, in a serious condition, must explain the reason for the delay. If he saw the patient early and had treated him medically through the attack, followed by collapse and a dangerous condition requiring operation where there is a high mortality, he should explain to us the cause of delay. The same holds true with regard to cases of disease of the gall-bladder. We have a low mortality following operations on uncomplicated gall-bladder cases, and a high degree of mortality, say 10 to 30 per cent. or more, in the worst and

most formidable cases, where we have infection and the gradual passage of the stone, which has gone through the cystic duct, after leaving the gall-bladder, each advance creating a more serious condition, finally reaching the common duct. Then we have the complications of sepsis and perhaps involvement of the pancreas, each condition adding to the mortality rate under any possible circumstance. Many such cases, if they had been recognized early and operated early might have been saved. When we consider that practically all cases of primary cancer of the liver are a result of chronic irritation, and when we also consider that from 3 to 4 per cent. of the cases which come to operation show such a condition of primary cancer of the bile tract, and that we find gallstones lying at the point where carcinoma has evidently originated, it behooves us to make a plain statement of the facts to any patient suffering with this disease so as to influence him or her, as the case may be, to have an operation performed as early as possible. Operation in these cases should not be delayed if we expect to improve the mortality, particularly if they are in the intermediate condition of the stone or stones being in the common or cystic duct. If they decline to be operated, then they should take the responsibility. They dislike to do this. If the matter is explained to them carefully that operation is the best, they usually accept it.

As to the removal of stone from the cystic duct, in our earlier operative work this used to be a difficult matter. It meant sometimes an hour's work to get a stone or stones out of the cystic duct, and in so doing the duct was mutilated more or less, causing a stricture there, and the gall-bladder was in such a condition as to make a continuous mucous fistula which required another operation for its closure. One of the easiest ways now we find to get stones out of the cystic duct is to make an exploration before we open the gall-bladder, explore the ducts, particularly the cystic duct, in order to get at all possible conditions. Before we open any case we do not know the degree of infection or the condition of the contents of the gall-bladder. The gall-bladder is very much like a rubber bag; if you compress it with the fingers of one hand when there is a stone in the cystic duct it will dilate and allow the stone to be popped out of the duct by the finger below it. In many of these cases, by the time you get through with your manipula-

tions, you are liable to have a stricture, necessitating the removal of the gall-bladder.

As to the question of removal of the gall-bladder, I think there is now a middle ground for discussion. It is somewhat like the middle period of appendicitis. We are all agreed as to the early period or the two-day period of operation for appendicitis. We are also agreed as to late operation for that disease. But the intermediate few days is still a matter of discussion. And so it is with regard to the removal of the gall-bladder. If we find a cystic gall-bladder, which has evidently been out of commission for many months, the removal of such a gall-bladder is necessary, provided the common duct is open. There may not be jaundice at any period. By removing the gall-bladder from the bottom up, getting below the stone, it makes a comparatively safe and simple operation.

The greater the degree of infection the more grave the operation must be, as in cases of appendicitis. Naturally one learns the limitations in these cases, and I may say that the limitation of one surgeon may be different from that of another. Each man must learn these things for himself. We do not remove as many gall-bladders for some conditions as we did formerly. There is no question but that there is a higher degree of mortality from which we cannot escape in the removal of the gall-bladder, as compared with the simple operation of draining the gall-bladder, and it is possible that only very few of these cases make future trouble and that another operation might not add as much risk as to remove the gall-bladder during the septic period.

Dr. J. Garland Sherrill, of Louisville, Kentucky.—I simply rise to question the wisdom of following the advice of Dr. Dunning in dilating a strictured cystic duct with an instrument. I doubt very much whether we can get the proper dilatation, one that will not contract again and leave the duct sacculated, favoring the production of gallstones, also favoring the development of malignant disease. If you cut the stricture, you are likely to get another one at that point. In cases of that kind, where we have a badly strictured duct, it is wiser to remove it with the gall-bladder than to leave it and run the risk of the new formation of a stone or stones, and later the development of malignant disease.

We are beginning to realize that malignant disease occurs much more frequently as the result of gallstones than we were formerly led to think.

I removed a large gall-bladder this morning which contained a number of small stones, running down in the cystic duct. The gall-bladder contained no bile, but some blood and broken-down tissue of a cancerous nature. This cancerous condition involved a portion of the liver, necessitating resection of a portion of the liver along with the gall-bladder. I have met several of these cases of cancer of the gall-bladder, and undoubtedly all of you have met similar cases, which are the seat of primary carcinoma, due to the gallstone itself.

When we have a case of strictured gall duct, closely fitting around the stone, that will not respond when we press in front and force bile down, which requires instrumental dilatation and section with a scissors, in my judgment it is bad practice to leave it.

Dr. George W. Crile, of Cleveland, Ohio.—In cholecystectomy in some cases less hemorrhage is encountered if the outer layers of that part of the gall-bladder attached to the liver be left, thereby avoiding the exposure of liver tissue. This may be accomplished by removing only the mucous membrane over this portion and the entire wall of the other portion of the gall-bladder.

Dr. Charles A. L. Reed, of Cincinnati, Ohio.—The paper presented by Dr. Ransohoff is the only one of the series I had the pleasure of hearing. Certainly, the two cases reported by him are very instructive, and the more so possibly because they are unusual. His careful recital of the histories puts us on record with regard to diagnosis. I must confess, I did not exactly comprehend the symptomatology upon which a positive diagnosis of gangrene of the gall-bladder was predicated in the first instance, and I hope the doctor in his recapitulation, in closing the discussion, will emphasize, with his characteristic distinctness, just exactly upon what signs we may base this positive diagnosis.

It is much easier to study this case theoretically than when we have it in hand. It seems to me the case of gangrene of the gall-bladder was purely one for immediate cholecystectomy; but in the light of the sequelæ of the case that criticism is silenced.

With regard to the umbilical sign that has been noticed, it is very probable that it exists and probably has escaped our observation. I have never seen free bile in the peritoneal cavity from rupture of the gall-bladder or gall-ducts.

In one case which happened in the practice of Dr. Marxmiller, of Cincinnati, there was a constant history of gallstone colic which extended over twenty years. The man was suddenly taken with pain in the right upper quadrant of the abdomen. There was no temperature reaction; no particular disturbance of the pulse, but there was gradually increasing distention, and after a while the pain shifted to the lower right quadrant of the abdomen. When I was called in the case one of the diagnostic points considered was the relative probability of appendicitis or gall-bladder involvement. We voted in favor of involvement of the gall-bladder, operated, and found very large quantities of free bile in the peritoneal cavity. I mention this case particularly because of the character of the perforation. It was non-adherent, distinctly hypertrophied, the gall-bladder had a very thick wall, and the character of the perforation was almost as distinct as the perforation of a peptic ulcer, as if punched out, and probably had in the tract of ulceration a small calculus which we did not find. The man made an uninterrupted recovery; and so far as the innocuousness of bile in the peritoneal cavity is concerned, it seems to have been exemplified in this case.

In another case the opposite condition, so far as constitutional involvement is concerned, was shown. In this case I was called about four days after evident rupture of the gall-bladder. I found not only jaundice about the umbilicus, where probably it first appeared, but it was very general, with distinct intensification over the entire abdominal area as if the saturation had extended from the peritoneal to the cutaneous surface. This was another instance of ulcerative, perforative gall-bladder, with a thickened wall, and from which I removed the interior mucosa.

The paper of Dr. Ransohoff is certainly very instructive, and I am sure our transactions will be enriched by having his case of gangrene of the gall-bladder published therein.

Dr. Charles L. Bonifield, of Cincinnati, Ohio.—I would like to speak briefly of a case I saw six months ago. The patient

was a Sister of Charity, in whose case a diagnosis of gallstones was made by my friend and fellow member, Dr. Ricketts, the day before I saw her. She was removed eight or ten miles to a hospital. Her abdomen was distended; pulse rapid, and she had every symptom of acute infection of the gall-bladder. I made an incision over the gall-bladder, and much to my surprise in opening the peritoneal cavity found a large quantity of fluid, which appeared to be pus, stained with bile. When I say a large quantity, I mean it was a quart or more. We immediately both said that we had a perforation of the gall-bladder to deal with; but on further exploration we could find no perforation either in the gall-bladder or its ducts. There was a large stone, the size of a pigeon's egg, the small end of which was incarcerated in the cystic duct, the other end projecting into the gall-bladder. We thought we had overlooked the cause of a purulent peritonitis. We enlarged the incision, looked at the appendix, and found it was normal. We then explored the pelvis for a possible cause for the purulent condition and found a small ovarian cyst, which was non-inflammatory. We removed the cyst; we also removed the gallstone from the ducts, doing an ordinary cholecystotomy and draining the peritoneal cavity, after having flushed it out with salt-water, and sewed the wound up. But there was absolutely no effort on the part of the wound to heal on account of the condition of sepsis. We retained the intestines within the abdominal cavity for more than a week by gauze sponges, and the patient made a slow, but finally satisfactory recovery. I do not know how this general infection had taken place, unless at the site of the stone there was ulceration of the duct, and the germs escaped in this way into the peritoneal cavity.

Just a word or two with reference to the procedure advocated by Dr. Dunning. I do not think it should be entirely condemned. The fact is that the stone may be very large and there may be a stricture which will prevent the stone from being forced back into the gall-bladder and yet the calibre be ample for the passage of bile. I do not think Dr. Dunning means that he does this operation in cases where the stricture is small. I think the procedure suggested is a valuable one in such cases. It has been my practice, if I could not get the stone back into the gall-bladder with a moderate amount of manipulation, to make an incision

over the stone, remove it, carry a drainage tube through the gall-bladder clear down to the bottom of the incision so as to pick up the bile as it comes from the duct, put another drainage tube outside the duct, and close the abdomen,

Dr. W. D. Haggard, of Nashville, Tennessee.—Referring to the cases of cystic duct obstruction, I have been able to remove a stone in two or three instances, where the gall-bladder was quite large, by simply turning the gall-bladder inside out, bringing it up onto the surface and expelling the stone just opposite to the reduction of a phimosis. I have been able in two or three cases to expel stones in that way which it would have been impossible to remove with forceps. If these cases have hydrops of the gall-bladder they should have a cholecystectomy.

I can recall three cases, in two of which there was clear fluid in the gall-bladder, and in the other seropurulent fluid, that got well without fistula.

In cases of stone in the common duct, where the mortality ranges from 10 to 15 per cent., where there is migration of the stone into the duct, the keynote is drainage. If one is able to introduce the index finger into the foramen of Winslow, and bring the duct to the surface, the mechanical feature is not difficult.

I want to say a word or two with reference to fishtail drainage that has been so extensively used by the Mayos but which has not been described very much, and has not been published. It consists of a rubber drainage-tube with a $\wedge$ cut out of one end and introduced into the duct, allowing the bile all the time to run along underneath the fishtail, if there is no obstruction. If there is obstruction the tube then acts as a safety valve. It is the most ingenious device for drainage I am acquainted with.

I wish to speak in reference to the isolation of the infected area of the gall passages. Most men like to do away with gauze in the peritoneal cavity as much as possible, and I dare say some of us have adopted some method to protect the gauze with rubber tissue. If you do not adjust the gauze and rubber tissue in such a way in these cases that they will not become displaced by the excursions of the diaphragm, and prevent adhesions, sooner or later they will surely become displaced, and I have adopted the plan of sewing the rubber tissue to the

wad of gauze, sponge, or pad so that it cannot become displaced, and arranging the whole around the area as a coffer-dam. This method would come in very well if one should be fortunate enough to have such a case as Dr. Ransohoff has reported.

In this connection, I desire to speak briefly of a case of rupture of the gall-bladder in a man after ten days of peritonitis localized in the upper abdominal area, who finally began to run a temperature and develop a large mass in the lower abdomen, leading one to revise the original diagnosis of cholecystitis and to presume that the patient had appendicular inflammation, with large abscess. He ran a temperature, with dulness on percussion, bulging into the rectum, and general septic symptoms. Upon section, when the mass was reached, there was a dark clotted, bloody fluid found, which was perfectly walled off, and in the bottom of the cavity between the rectum and bladder were five gallstones which resulted from rupture of the gall-bladder, while in the incipiency of his infection, some twelve days previously, and accompanied with hemorrhage at the time, all of which were segregated by an inflammatory exudate in the abscess cavity. I think a case has been reported similar to this by Dr. Vance, of this city, who actually demonstrated bleeding at the time of the operation from rupture of the gall-bladder.

In reference to stone in the hepatic duct, it is well-known that these cases are so rare, so infrequent, that the feature of surgical management is drainage of the common duct, removal of the stone or stones from the hepatic duct, which can be done by milking the stone down rather than attempting its removal by instrumentation. Most men practice digital exploration of the gall passages rather than instrumental. There is some condemnation of the attempted operations of drainage of the hepatic duct into the stomach or duodenum by the method of Quenu, which consists of an anastomosis between the duct of the stomach. Drainage, either by direct tubage of the hepatic duct or fishtail drainage of the common duct, after the removal of stones from the hepatic duct is quite sufficient in the majority of instances.

Dr. Dunning (closing the discussion on his part).—Before I close the discussion on my own paper, I would like to report a case of gangrene of the gall-bladder which came under my observation, a detailed history of which I cannot give at this moment. The patient was a woman, aged thirty-five years,

who gave an indefinite history of gall-bladder disease for about six weeks. I found her in the country, and had her taken to the hospital. She was septic at the time I saw her. I doubted the advisability of an operation, fearing she would die. There was no history of gallstone colic. There had been slight jaundice. On opening the abdomen I found a large gangrenous gall-bladder which contained considerable bile. The gangrene was marked; the gall-bladder was dark; the tissue was friable; the adjacent part of the liver was involved in the gangrene. I did a cholecystectomy in this case, and removed a portion of the liver, which was gangrenous, with a curette; then I trimmed off the edges with scissors, and finally stitched the parts to some extent to prevent hemorrhage.

Mayo Robson states, I believe, that there are only two or three cases of gangrene of the gall-bladder on record. Here we have had the history of two cases to-day. In my cases no stones were found in the gall-bladder, the cystic duct, or common duct. It was a case of closure of the cystic orifice.

In reference to the procedure which I proposed, it will be remembered that in my case the gall-bladder was distended with bile, and this was stated as one of the conditions necessary or as indicating the removal of stone from the cystic duct. If the gall-bladder is not distended with bile; if it contains a small amount of bile of dark color, in the majority of instances it would indicate bile stasis, and the chances are we have a stricture of the cystic duct beyond the stone, so that I think those are the cases that are inapplicable for any method of removal of the stone except by removing both the gall-bladder and the cystic duct. In a given case in which the gall-bladder is fully distended with bile, which is very nearly normal in character, which indicates that the cystic duct is open, it seems to me that the case demands removal of the stone and that we are safe entirely in drainage of the hepatic ducts under the circumstances. We have the highest authorities who concur in that view.

Regarding the matter of incising the edges, we have parallel instances in many lesions. We know that small incisions will relieve tension and enable us to dilate in these cases with the greatest ease. It can do no harm, and I believe it will facilitate dilatation greatly. I simply throw this out as a suggestion.

I hope some of you will try this procedure, if you have the difficulty I had in removing these stones. I spent fully half an hour in diligent labor in removing them. Robson mentions thirty-five difficult cases of this kind, gives their subsequent histories, showing that no unfavorable results followed his method of operating. This procedure is so simple and so much superior to crushing the stone, I believe it will appeal to you.

Dr. Long (closing the discussion on his part).—I have nothing in particular to add to what I have already said. I feel very grateful for the discussion which the papers have brought out. Dr. Mayo very properly emphasized the very great importance of operating on these cases while the stones are in the gall-bladder. He also pointed out the difference in the mortality from gall-bladder operations and operations on the common duct.

In connection with Dr. Ransohoff's cases, I will say that less than a year ago I had a case of gangrene of the gall-bladder. However, in my case there was a large stone in the cystic duct. There were so many adhesions around the gall-bladder, and the condition of the patient was so extreme, I felt, instead of removing the gall-bladder, it was better to drain. The gall-bladder tissue was so pulpy in this case that I could easily have pinched through the gall-bladder with my fingers at any point. I drained it inside and out. At the removal of the first dressing the entire lining of the gall-bladder seemed to come out as a slough. The patient made an excellent recovery.

Dr. Ransohoff (closing).—I have not heard of this fish-tail drain to which Dr. Haggard referred, but I can see it is a very bright and excellent idea, and it is like many other ideas that have emanated from Rochester, Minnesota, it is good. I have for a long time provided for the drainage of bile from the hepatic duct into the duodenum by simply making a lateral opening in the drainage tube, that is, in the hepatic duct. If one introduces an hepatic tube for hepatic drainage into the hepatic duct, by making an opening down here (indicating), one can easily make that opening in such a way that drainage can be established. I believe that is the idea of the fishtail drainage. If the ductus communis choledochus is patent, the bile can drain through.

I was very much interested in the remarks made by Dr. Mayo in going back to the operation of cholecystotomy as compared with cholecystectomy. One of the chief reasons given years ago for the operation of cholecystectomy was that by this operation surgeons guaranteed, I might say, against the recurrence of stone. Long ago I contended in a paper I read before the American Medical Association that stones in the gall-bladder are formed at one and the same time. It is an unusual thing to find in gallstones all of the stones of the same size, particularly where infection occurs at intervals. We may find four or five large gallstones, and by the side of them a large number of small ones. In such cases two infections have occurred, and every time the gall-bladder is infected, there is a possibility given for the occurrence of gallstones. I do not think gall-bladders are often infected, and, therefore, if we remove all the gallstones at one time, there is not much likelihood of a recurrence even though we leave the gall-bladder. In most cases where there has been a supposed recurrence of gallstones, there was no recurrence but some of the gallstones had been left. Every surgeon who has operated on gallstone cases has sinned in this regard, and if he does sin by not removing all of the gallstones, he is almost sure to get recurrences. If he does not sin in this regard, he is not going to have recurrences.

With regard to the greater danger of cholecystectomy as compared with cholecystotomy, I do not think it is fair to charge the greater mortality of the operation of cholecystectomy to the operation itself, although doubtless shelling out the gall-bladder inflicts more extensive trauma. If we remember that the conditions for which we do cholecystectomy are so much graver than those for which we do ordinary cystotomy, it is only likely that we should get a larger mortality after a cystectomy than after a simple incision.

One other thing and I have finished. My friend and colleague, Dr. Reed, asked upon what I based my diagnosis of gangrene of the gall-bladder in the case I reported. If I said anything in my paper, it was that the diagnosis of gangrene of the gall-bladder was not made, and we had suspected the existence of appendicitis.

MY EXPERIENCE WITH DOWNES' ELECTRO-THERMIC ANGIOTRIBE IN PELVIC AND ABDOMINAL SURGERY.

By J. Wesley Bovée, M.D.,
Washington, D. C.

After hearing papers read by Drs. A. J. Downes and C. P. Noble, of Philadelphia, on the use of the electrothermic instruments of the former in surgery and seeing Downes apply his angiotribe to tissue, I resolved to try them. Accordingly, in March, 1903, an outfit of them was secured by Columbia Hospital for Women and I have employed them in two hundred and three abdominal and twenty-seven vaginal operations. These two hundred and thirty operations have been hysterectomies, and panhysterectomies and removal of the appendages by the vaginal route, removal of the same structures by the abdominal route, removal of the vermiform appendix, the spleen, the kidney, of parovarian cyst, of portions of the intestines, etc. Perhaps I can best describe these instruments and their *raison d'etre* by quoting from Downes' paper. He says:

"With the development of aseptic surgery arose the necessity in hemostasis not only of a certain method of occluding the vessels, but of doing it with an agent which would not add a complication to the case either immediately or remotely. No method of hemostasis generally used fulfils this definition. The use of the actual cautery leaves carbonized tissue a slough and the danger of subsequent hemorrhage. The objections to silk ligatures, especially the size required for large blood-

vessels and pedicles in the pelvis, are only too well known. The introduction of sterile absorbable ligatures bids fair to solve the problem; yet we have lately the angiotribe, which is also uncertain, for Doyen and those following him use it now simply to compress a groove in which the animal ligature is applied without danger of its slipping. The angiotribe alone, without the addition of the ligature, is slow and with safety cannot be removed much under three minutes. If applied four times in a case nearly a half-hour is consumed, for the time used in removing and applying is considerable. In the shorter process by the angiotribe with the ligature added we retain some of the dangers of the ligature. In the use of the ligature, the personal equation is a great and important factor in the results obtained. Yet allowing absolutely perfect technique and sterile material the ligature in an infected field or when thrown around such a body as the appendix or Fallopian tube is especially objectionable. I will make no attempt to cite cases showing the various effects following occasionally the use of ligatures. I will say this: If it is possible to control hemorrhage within the abdomen and pelvis without the use of any extraneous material which remains after hemostasis and by a method which is rapid and fulfils the definition of a perfect hemostatic as given in the beginning of this paper, we have added very materially to the resources of surgeons. Is there any hope of such a possibility? I believe so. As already stated, the angiotribe is slow, and after its use a fair percentage of cases bleed. There is something missing in this instrument, that is, sufficient heat in the compressing blades to cause coagulation of the albuminous constituents of the compressed area. This compressed and coagulated area under the proper amount of heat becomes desiccated. The constituent histological elements, whether bloodvessels, nerves, or mucous membrane, in the areas so treated lose their identity so that the microscope does not discover them. The only practical method of obtaining heat in the blades in a measurable and controllable form is by electricity. Hence,

the instruments are electrothermo-hemostatic."—*Journal of the American Medical Association*, 1901, xxxvii. pp. 419-424.

"In 1862, and for some years after, Baker Brown controlled ovarian pedicles by compressing them between the blades of a heavy clamp and applying the actual cautery to the sides of the blades until they became hot enough to cook the compressed ribbons within their grasp." In those days of septic surgery, his mortality rate was far below that of his confreres and secondary hemorrhage was unheard of after his operations. Some years later, Keith further developed this method and used it through a series of years with remarkable result. Among those who followed Keith in this practice was Dr. Skene, of Brooklyn, who after quite an experience in the use of the actual cautery applied against the blades of pedicle forceps to obtain heat, conceived the idea, after having seen the electric flat-iron, of including within the blades the heating medium. To Skene, therefore, belongs the credit of instituting electrothermic hemostasis. His instruments being first production were imperfect and would never have made this method practical, for they furnished neither sufficient pressure nor heat, and were not practically sterilizable.

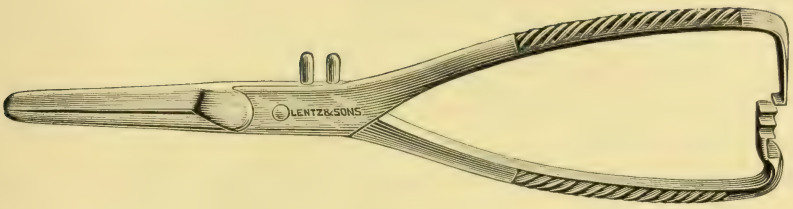
"The essential elements in this method are first, and of greatest importance, pressure, and second, heat. The instruments of Skene were made in such a way that a practical blade giving the proper amount of pressure and heat was not possible. The heat-chamber was closed on the rear of the active blade by a plate, in the sealing of which, if soft solder were used, the plate warped and loosened during use by the heat in the blade, while if hard solder were used the temper of the blade was lost during manufacture and pressure thus made impossible on a pedicle of any thickness. Skene also recommended that a temperature of 190° F. only was necessary and that the heating process should be slow. This, with the above imperfections, accounted for secondary hemorrhage and disuse of this method. After making at least fifteen

different instruments, I finally succeeded in making a type of blade retaining all the temper and strength of a cold, highly tempered instrument. An invisible overlapping plate, covering and sealing, without the use of hard solder, the recessed heat-chamber in the pressing surface of the active blade made this possible. Another great improvement which I developed was the placing of the connecting poles near the active blade, thus ensuring cool shafts or handles to the instrument. Another innovation consisted in using the principle of the angiotribe, thus obtaining what is absolutely necessary, the proper degree of pressure and heat between the blades. Finally the method of insulating and cementing the platinum and its connecting pole, making it possible to submit my instruments to the same degree of sterilization by boiling that any ordinary instrument will stand, completed the practical improvements which were absolutely essential to the success of electrothermic hemostasis.

"For those unacquainted with this method, the following explanation is offered: Pressure, approximately that of a medium-sized angiotribe, is applied to the tissue to be hemostased, and the compressed ribbon thus formed is rapidly submitted to a temperature of not under 212° F., thus coaglating and agglutinating under pressure its albuminous constituents. In addition, the heat even travels a short distance beyond the area compressed into the adjacent tissue, and causes a shrivelling of the intima of the bloodvessel leading beyond the ribbon. Clotting, therefore, occurs a considerable distance beyond the ribbon. The possibility of hemorrhage after proper technique is inconceivable.

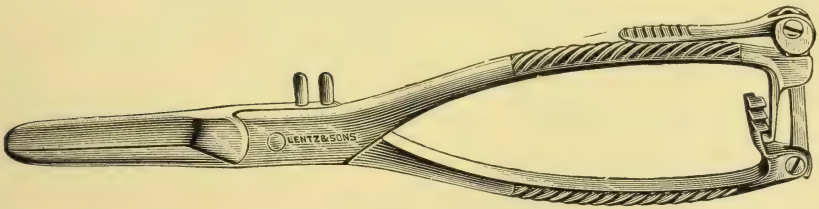
"In Figs. 1 and 2 are seen the latest type of instruments with straight blades two-and-one-fourth inches long, but varying in width for the different sizes, the widths being one-fourth, three-eighths, and one-half inch. In Fig. 3 is seen the same type of instrument with curved blades. The narrow blades have handles releasing on maximum pressure. The three-eighths and one-half-inch blades have a lever at the end

Fig. 1.



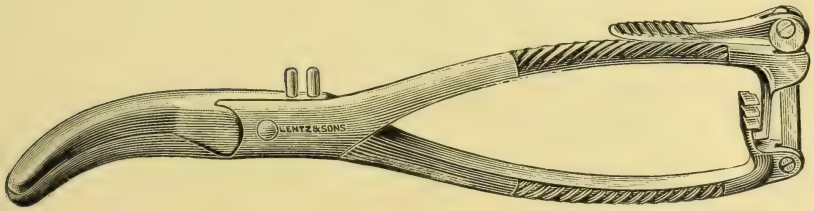
Smaller sized electrothermic angiotribe (Downes).

Fig. 2.



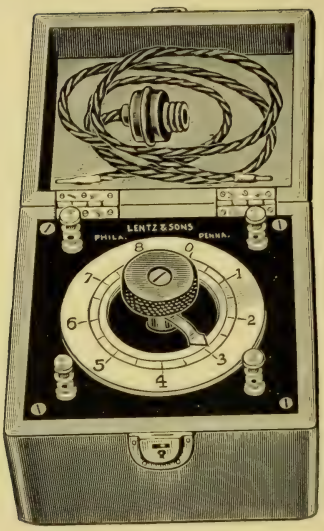
Larger size, showing lever.

Fig. 3.



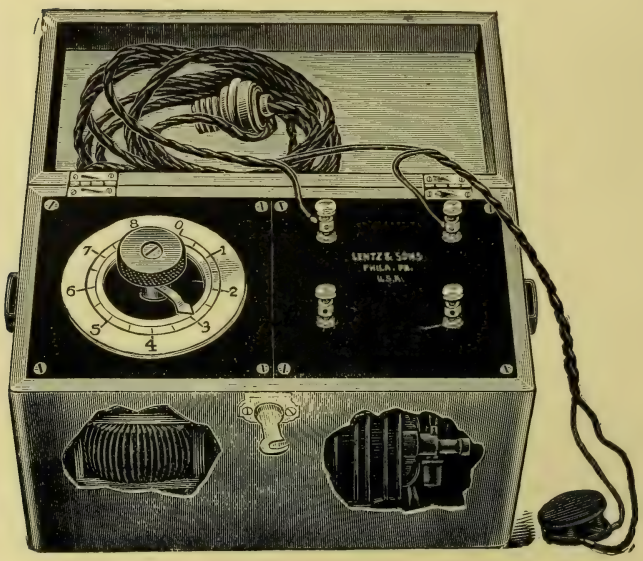
Same as Fig. 2, except the blades are curved.

Fig. 4.



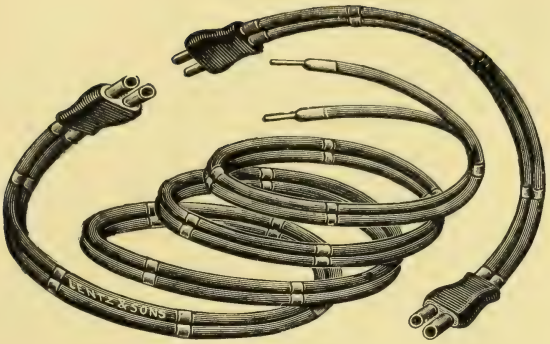
Simple transformer for alternating current.

Fig. 5.



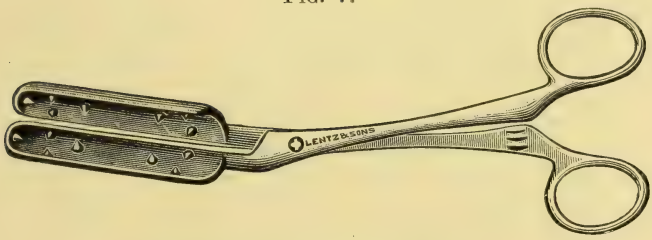
Transformer and motor for use with the continuous current.

Fig. 6.



Cable or coupler.

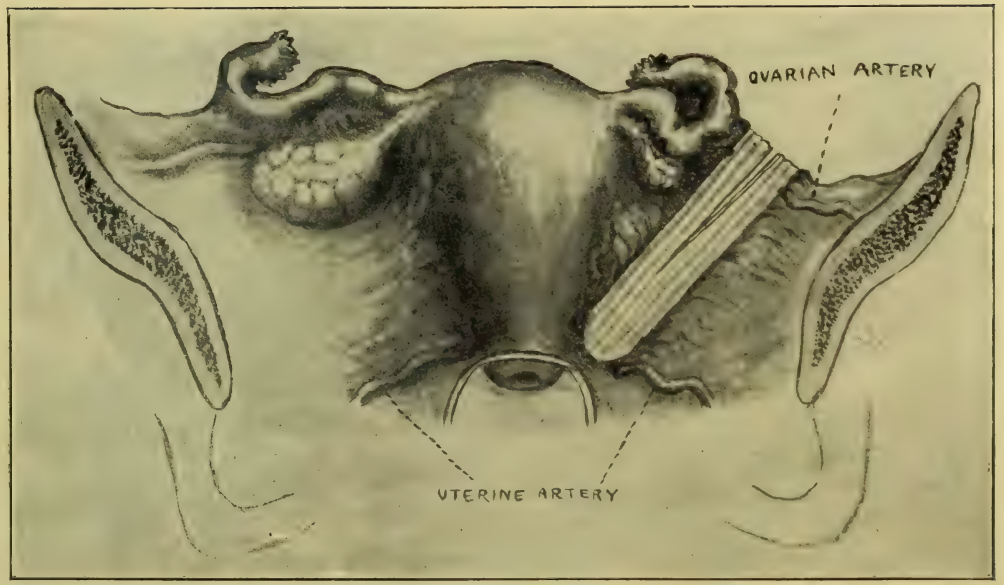
Fig. 7.



Shield for covering angiotribe.

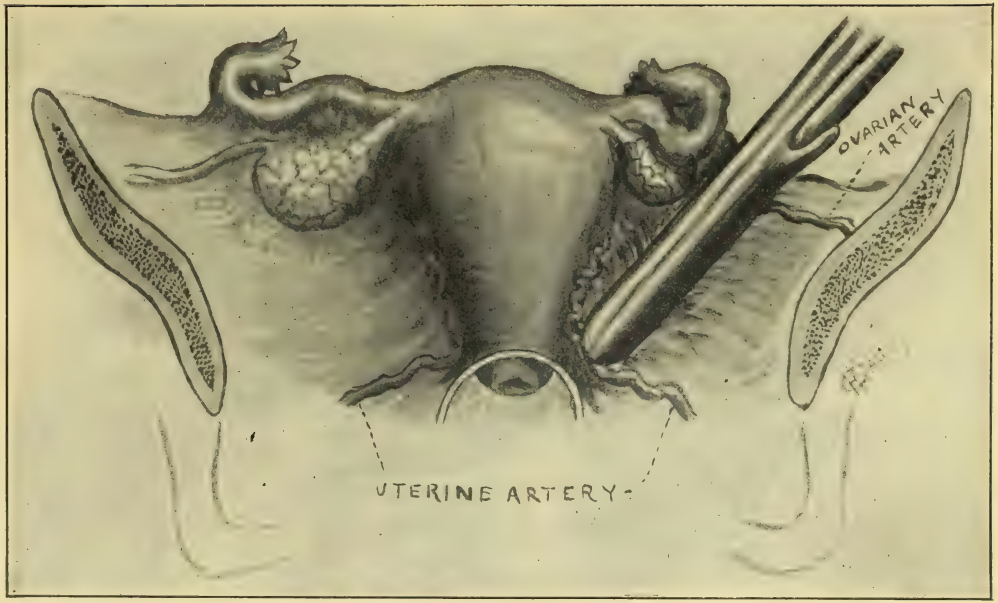
Fig. 8.

Fig. 9.



Uterus with blades removed, showing hemostased tracks of blades.

FIG. 10.



Uterus with blades of angiotribe in place on broad ligament.

Fig. 11.

of the handle. For the curved blade the three-eighths-inch width is the most practical.

"In these instruments the heating medium is an insulated ribbon of iridoplatinum which becomes red-hot or even white-hot by the resistance it offers to the passage of a suitable electrical current. The necessity, therefore, of the electrical current in a modern operating-room is apparent. With the electrical current in the operating-room there are required controllers to reduce it to the requirements of these instruments. For the alternating current a simple transformer like that seen in Fig. 4 is required.

"When the direct current is used there is required a motor in addition to the above transformer, and mounted with it. In Fig. 5 is seen a motor transformer, the motor of which was recently especially devised for use with these instruments, and is but a third the size and weight of the motor formerly used for this purpose.

"In Fig. 6 is seen the cable for connecting the motor transformer with the blades of the angiotribe This cable is constructed of mineral and rubber and will stand indefinite boiling. The cable can be in one piece to be boiled for each operation, or it can be made in two parts, a long part to conduct the current from the transformer to the operating table and a short part or coupler to connect with the first part. The coupler is to be sterilized for each operation.

"While novel, this instrumentarium is not complicated and allowing the generating source of electricity it is quite simple, in fact, it is less complicated than the outfit required in ligature work.

"By this method hemostasis can be effected *en masse* or isolated bloodvessels can be compressed by the points of the narrow blades. Unlike ligature work *en masse* hemostasis by this means is not open to objection since there is no constriction, no nerves are irritated, no exuding surfaces are left, compressed ribbons of coherent, sterile, non-bleeding tissues only remain.

It will readily be seen that hemostased tissues of this character lessen the danger of adhesions.

"It is impossible to construct an efficient thermic blade that will not become hot throughout, hence, protection of the surrounding tissues is necessary. This can be effected by gauze, but much better by the shield seen in Fig. 7, which surrounds the heated blades, but comes in contact with them by fine points only and these points transmitting but little heat, the shield remains quite cool, thus making the use of electrothermic blades entirely safe within the abdomen.

"For small bleeding points met in incisions, in amputation of the breast, in neck operations or any place where ordinarily fine ligatures would be required, I have devised a platinum loop called an artery forceps electrotherm. This little heater (Fig. 8) at a bright red heat applied to the tips of the ordinary hemostatic forceps will transmit sufficient heat in five seconds to control any small bloodvessel within their grasp. The tips of the hemostatic forceps against which the heater rests may have a slight groove in it as a point of purchase for the platinum loop. This little heater replaces a number of perishable small electrothermic forceps. In addition to the above outfit there is required a platinum knife. It is similar to the artery forceps heater, but is made with a wide surface like the usual platinum cautery knife.

"A complete electrothermic outfit, therefore, consists of a few angiotribes with blades of different widths, including one with curved blades, the shield, the cautery knife, the artery forceps heater, the cable, the electrical current controllers, consisting of the motor transformer, for use with the continuous current and a transformer for the alternating current. With this outfit and a sufficient number of ordinary hemostatic forceps any hemostatic problems in surgery can be solved.

"The platinum in the instrument, the cautery knife, and the heater should be the same in weight and require about the same maximum current, 60 amperes. This is a higher amperage than has ever been used in electrothermic instruments;

but the heat developed in a piece of platinum requiring this amperage causes our blades to heat more rapidly and to be more serviceable than when less current is used. There is also less danger of burning out the platinum. The same current being required by all the instruments, including the cautery knife and heater makes it possible to dispense with a meter. The current that will render incandescent the cautery knife, and heater is approximately 60 amperes. This is an indication, therefore, that our rheostat is adjusted to the proper point, though the blades will take more current. For each operating-room, therefore, the current can be adjusted so that the cautery knife is brought to a bright heat and without change this current can be used. The practical way, therefore, without a motor, of judging the proper amount of current necessary to heat the instruments is to gradually turn on the rheostat of the transformer until the platinum in the cautery knife or in the heater is a bright red. For each individual operating-room. when this point is reached, on the transformer it can be set and never changed, the current being switched in from the electrical light socket. The current that heats the knife, as just described, turned into the angiotribes will cause water placed on the pressing surface of the blades to boil in ten, fifteen, and twenty seconds for the different widths, one-fourth, three-eighths, and one-half inches. In using the instruments, therefore, it must be remembered that this amount of time, ten, fifteen, and twenty seconds, is used before the blades become sufficiently hot, and that we should allow from ten to thirty seconds after this while the instruments are applied to the tissues to be hemostased. The current, therefore, for the various sizes should act from twenty to fifty seconds. It will be found, however, in practice that the narrow-one-fourth inch blades can be used on the meso-appendix, on the mesentery, or on any thin tissue in about twelve seconds.

"As one becomes accustomed to the method it will be found unnecessary to count or keep time, for the cooking of the

tissues lets us know when we have sufficient heat. The operator should always remember that heat alone without the proper amount of pressure between the blades will not control the bloodvessels, and, therefore, the angiotribes should be used at maximum pressure. There is a minimum amount of time that the instruments should be used, with the proper amount of heat and pressure, but no harm occurs if a little more time than is necessary is consumed by the heated blade. When one has become accustomed to using this method it will be found possible, with the rheostat set at the proper place, to have in each operating-room the transformer or motor transformer out of sight, under the operating table, with the cable connected with it and running to the edge of the operating table, and with the short sterilized coupler lying with our instruments near the field of operation, but coupled to the first part of the cable at the edge of the operating table. For each operation, the instruments and this short coupler cable can be resterilized. I have lately found a foot breaker very valuable. It dispenses with an assistant, the operator being in absolute control. The current is turned on when required by the pressure of the foot.

"The following rules will be found useful:

"The pressing surface of the blades must be smeared with sterile oil before each application.

"The field should be dried and freed from blood and the surrounding tissues protected from the outer surfaces of the blades by gauze, or preferably by my shield.

"After each removal of the blades from the hemostased tract, they should be cleansed to remove all charred adhering blood and the pressing surfaces re-oiled.

"Too short an application should be avoided. No error is committed if the time is some seconds longer than required.

"The shield should be applied after the adjustment of the angiotribe and be removed last, so that the compressed hemostased ribbon can be examined before letting it drop from view." (*American Medicine*, 1903, vi. 860-865.)

Technique of Application. *In vaginal hysterectomy* the steps preceding hemostasis of the uterine artery are the same as for the ligature operation. The angiotribe is now applied to the whole or a part of the broad ligament close to the uterus the same as any other clamp would be. I have usually applied the smaller one and to but the lower half of it at first. If the ligature is very thick I prefer the heavier angiotribe, as it exerts more pressure and has a wider grasp on the tissues, though more time is required to heat the blades. The shield is carefully applied over the angiotribe and gauze packed about the shield to protect the ureter, bladder, and rectum from undue heating. The uterus is freed from the clamp before or after cooking, as one prefers, by cutting through the ligament against the angiotribe. The cable or coupler is now attached to the angiotribe and the current turned into it. Until one becomes familiar with the instrument it is well to take the actual time of application. The angiotribe is now applied to the other broad ligament in a similar manner. The remainder of the broad ligament and the round ligament, either by the side of the uterus or across the infundibulopelvic ligament, is now clamped, due care to prevent including other strictures being exercised. The shield is applied and gauze most carefully packed lightly about the instruments. Care is also necessary in order that the vaginal wall and vulva do not come in contact with the heated instrument. The pedicle is now severed and cooked and the other side treated likewise. The peritoneum may be now closed or the space entirely filled lightly with gauze to be removed as in hysterectomy by any other plan.

In abdominal hysterectomy (Figs. 9 and 10) the plan is reversed. If the ovaries are to be left the first grasp of the instrument is between the ovary and the Fallopian tube.

If the cervix is to be left it is amputated after the uterine vessels are secured and the stump of it covered by suture as if a ligature operation were done.

In salpingectomy or *salpingo-oöphorectomy* one application

of the clamp is often enough. Particularly is this true with the curved angiotribe. If the broad ligament is much infiltrated or the tube very large two applications instead of one has seemed to me to be preferable.

In ovariotomy for large tumors the pedicle can usually be secured by one application of the instrument. Bleeding omentum may also be grasped with the instrument and cooked. I have not found a case of large uterine or ovarian tumor in which I have thought the ligature was at any point superior either as to ease of application or as a safeguard against hemorrhage.

In appendectomy its superiority is readily recognized. My method is to transfix the mesoappendix at the cæcum with a pair of artery forceps and separate the blades of the instrument to enlarge the opening. A purse-string suture of very fine catgut is now placed in the cæcum at this level for later covering the stump of the appendix. The small-sized angiotribe is now made to grasp the appendix just distal to the artery forceps mentioned and the current applied from twenty to thirty seconds. It is now removed and the appendix separated by cutting through the ribbon thus made. The cæcum is fixed by an assistant's forceps and the purse string tightened. The stump is now pushed down and the purse string tightened and tied over the stump (Fig. 11).

In intestinal resection the method has been to apply the larger angiotribe astride the intestine and obliquely as far as necessary on to the mesentery, on either side of the part to be removed. The portion is now carefully cut away, cutting on the distal side of the ribbon of the mesentery and through it across the intestine. With care, the two intestinal ends are now sutured together with catgut covering about one-fourth inch of the bowel with each ribbon. After the sutures are tied, an index finger is pushed from either side through the buried ribbons to restore the canal at that point.

In nephrectomy and *splenectomy* the pedicle is caught by the larger angiotribe and the organ removed. This furnishes

a better opportunity to see the cooking pedicle. I have not employed the angiotribe in gastroenterostomy though Downes has thus employed it successfully in a few cases.

The advantage of the electrothermic angiotribe of Downes in pelvic and abdominal surgery as seen by the eye of experience seems to be more reliable hemostasis than by ligation; freedom from hemorrhage during operation, the ease of its application in locations in which the use of ligatures would be very difficult and uncertain; the greater security against dissemination in radical operations for malignant diseases, the ability to sterilize unclean areas before suturing as in intestinal and appendicular surgery, lessening of the tendency to formation of post-operative adhesions; the increased speed in operations such as removal of uterus, appendages, or vermiform appendix and the greatly lessened amount of pain following operation.

The disadvantages have been the danger of accidental injury of the bladder, rectum and ureter, the necessity of great precision in its employment and the special care necessary to keep the paraphernalia in good working condition.

In these two hundred and thirty cases I have had two of hemorrhage subsequent to operaton. I cannot believe the method of hemostasis employed is responsible in either instance. In the first, abdominal panhysterectomy was done for severe suppurative inflammation of the appendages of a very feeble and emaciated woman. Three weeks later, after being allowed to walk about for two days, she was seized with hemorrhage from the bowels, stomach, and vagina. A mass was found in the pelvis; her temperature became elevated as was the pulse rate. The hemorrhage continued at intervals for about two weeks without improvement, and then the abdomen was reopened without any form of anæsthesia, even local being refused by the patient. A large amount of blood coagula was removed from the peritoneal cavity, vaginoabdominal, through-and-through rubber-tube drainage installed, and thorough irrigation of the peritoneal cavity with salt solution was done after separation of multiform adhesions. Later

feces and urine escaped by both ends of the drainage tract. Persistent irrigation and feeding cured her malady and she is a robust woman to-day. In another two weeks, after vaginal hysterectomy for fibromata, the patient had a sharp vaginal hemorrhage after walking a little more than on previous days. An examination with a Sims speculum revealed a malodorous discharge from the left lateral fornix of the roof of the vagina. The temperature was elevated about one degree. Daily irrigation for a week ended the trouble. In both I am confident latent mild infection was responsible for the hemorrhage. In no other instance has hemorrhage occurred and I have the simplest and most perfect faith in the hemostatic properties of the instrument. In one case a vaginal fecal fistula followed vaginal hysterectomy and I was disposed to attribute it to the bowel having been included in the grasp of the instrument. This accident, however, is not by any means limited to this method of vaginal hysterectomy.

On the whole I am very much pleased with the instruments and believe in the great superiority of this over the ligature method, in such work as I have herein reported. It is not difficult to handle and little experience overcomes all awkwardness attending its early usage. I commend it to the use of the surgeon, as a distinct step in surgical progression. I feel I have given it an abundant trial in these 230 cases.

DISCUSSION.

Dr. Andrew J. Downes, of Philadelphia.—I have been very much pleased with the instructive and excellent paper of Dr. Bovée. I have found it a little hard to get practical men to look into this thing properly. These electrical appliances have been looked upon as toys in surgery, and men have felt that they were drifting away from their practical work should they become interested in the use of them. In the work I have done in the development and use of these instruments I have had in view the desire to make the method practical, and I really think I have. This method originated with Dr. Skene, who leaned

on the fact that the English surgeons, Keith and Baker Brown, and others, had been using heavy pressure forceps against which they applied the actual cautery or some other possible source of heat to cause the application of pressure and heat. Of course, the use of the actual cautery to bring the source of heat against the bladder is a slow, tedious and unpractical way; but the results they obtained even in those days were far superior to the work and results of others at the same time when ligatures and other methods were in vogue. Dr. Skene attempted to reduce this method to practicability. But his instruments were impractical, the mechanics who made them did not grasp the correct idea, and the instruments were neither sterilizable nor did they furnish sufficient pressure or heat. My instruments do both. They will stand as much handling as any ordinary surgical instruments. They can be boiled indefinitely as can also the cable. The time involved in the application was reduced by increasing the size of the platinum and increasing the strength of the current, so that now the blade of the instrument can be heated in from five to twenty seconds.

In the beginning of this work I thought of a meter and other things. It is now so practical that any man who devotes a little time to this work could arrange to have the source of electricity of either a motor or transformer, near the operating table, without the need of a meter or even a watch. In a certain time the heat comes to the blade and he can see with his eyes when the time is sizzling a little, and after a while he learns practically so that there is no necessity of counting time. There are a number of men, like Dr. Bovée who have found this out. One man, a busy surgeon of Philadelphia, when his hospital was removed recently and he had to operate in a new hospital not yet equipped with electricity, assured me that going back to the use of the ligature made his work go slower. I have a friend in Providence, Rhode Island, a busy surgeon, who does all his surgical work with these instruments, and as quickly as with ligatures. Occasionally one may have to go to a private house, and of course then it is inconvenient for one to carry a heavy storage battery with him. But in hospital work this method is extremely practical.

In four years I do not believe I have used the ligature except in one case, and that was in the case of a woman who was mori-

bund from extrauterine pregnancy, with my instruments not sterilized. With one exception I have not used the ligature in four years. When I say this it applies to all kinds of abdominal surgery. For instance, I have anastomosed the intestine; I have done gastroenterostomy; others have removed gall-bladders; kidneys have been removed in twenty cases, and, I think, at least four or five hundred hysterectomies have been performed by myself and others. I have done myself at least eighty hysterectomies in succession by this method. There is no reason why any man, who has developed a technique for doing these operations, cannot use these instruments after a little experience. It is simply a matter of using pressure forceps for the control of hemorrhage with the addition of heat.

Dr. Bovée referred to two cases of hemorrhage immediately following operation. I do not think any hemorrhage that occurs two or three weeks after the application of these instruments should be attributed to this particular method. I know of a number of cases of hysterectomy that have bled two or three weeks after operation by the ligature. There must be something necrotic about the tissues or they are cancerous. I do not think it is due to a slipping of the ligature two weeks after operation, nor to the ribbon which drops away because this method is used, but it is something in the particular case that caused it. If we do an operation and do not have a hemorrhage in two days thereafter, we do not think of it any more as a possibility. Any hemorrhage which follows two or three weeks after the use of this method cannot be justly charged to the method itself.

So far as pain after these operations is concerned, I have done work in two hospitals, and every nurse in these hospitals will say that my patients go through their convalescence with little pain. Hysterectomy for fibroid of the uterus can be done after this method and you will hardly think the patient has been operated on. There is generally pain where ligatures are used, but it is very much less after this method. By this method we cook and devitalize every nerve in the ribbon.

Another point is with reference to the adhesions that follow. I have operated on a few cases subsequent to the primary operation by this method. I would do too little, or simply remove one side as in one case. For instance, I removed the appendix

and subsequently operated on the tubes or ovaries. In all cases I have found the stump free floating in the pelvis. So I think there is reason for believing that the adhesions which follow operations by this method of hemostasis are altogether less, or absent.

In doing panhysterectomy for cancer there have been a few cases where the ureter was either burned or pinched; but a remarkable fact about all these cases is that not one of them that I know of required subsequent operation. If a ligament had been put there it would have gone around entirely.

Sometime ago I had a case in which the cervix was thick and the surrounding tissues infiltrated, and on the right side the infiltrate extended quite a little distance. Of course, I had to get beyond it as far as I could. This woman on the third or fourth day after the operation had a ureterovaginal fistula. The kidney filled up and the ureter dilated. About the time I was ready to do something for the closure of this fistula there was re-establishment and a subsequent operation was not required.

In doing panhysterectomies, especially for cancer, where the infiltrate extends down into the broad ligament surfaces, with the small forceps I have been able to go around carefully, bite by bite, and include an inch and a half of the vagina in four or five cases. I remember one case in particular, of a woman, sixty-four years of age, who was sent to me from Baton Rouge. Her case was considered inoperable six monthhs before. I did this thing on this case, and that woman lay in bed without pain. She subsequently went home and has been living for over a year now. I think in working deep in the pelvis, even in short, fat women, you can do better work with the bite of this small forceps than you can with a ligature carrier.

In regard to these angiotribes, I think myself the time will come, and Dr. Bovée and others are finding it out, when we can dispense with the lever at the end. With the inch angiotribe, I can do almost anything. It will give enough pressure and heat; you can leave it on longer if you wish; it is practical, simple, clean, and leaves everything sterile.

I know of one hospital where there have been two deaths recently from hemorrhage following hysterectomy by ligatures. This method does not cause hemorrhage. If hemorrhage should occur you can see it, while the wound is open. I use a knife

or scissors along the uterine side of the forceps, then remove the forceps, and if there is any bleeding, it is before my eyes. If it does bleed, I take my narrow-bladed forceps, pick up the isolated point and control it.

In operations on the breast, or in abdominal surgery, where we expose small vessels, I use an ordinary hemostat and in place of using ligatures I apply the cautery to their tips. I use the tip of my incandescent knife and thus am able to dispense absolutely and entirely at any place with the use of the ligature. If, for instance, at the hilus of the kidney I have a bloodvessel spurting from one of the small branches of the renal vein, by using a clamp with ordinary hemostat and cautery knife, I can control the hemorrhage at once.

Dr. Charles P. Noble, of Philadelphia.—Some years ago, when this Association met in Cincinnati, I read a paper on the use of these instruments for the removal of the uterus for cancer. Dr. Downes probably regards me as one of the unenthusiastic users of the instruments because I have never used them in any case except for this particular purpose. At the same time, having operated for cancer quite a number of times, I am perfectly familiar with them, and there is no doubt they are beautifully made instruments. They will do exactly what is desired as hemostats. They are very practical, very well made, and, so far as my experience goes, there has been practically no bother from the instruments getting out of order. I am not opposed to the use of the ligature, however, as Dr. Downes is, so that while I have used this instrument for cancer of the uterus, I have not discarded the ligature. Speaking of that one part of the subject, I am sure that the use of these instruments is a great advance in the treatment of cancer of the uterus. They have a number of advantages over the use of the ligature alone. In the first place, let me speak of the operation itself. The chief advantage of these clamps over the ligature is after the uterine arteries are tied on each side, and when we come down to the vaginal plexus—that is the most troublesome part of the operation in using the ligature. The veins are apt to leak and bleed in the field and it may require a large number of ligatures to secure hemostasis around the cut vagina. On the other hand, if these instruments are used, we have a perfectly dry field; there is no trouble with the hemorrhage from the vagina itself, nor

with the veins about the vagina, or as sometimes happens, with the veins under the uterosacral ligaments. It is a great satisfaction to use the instruments in these cases.

From the standpoint of recurrence of cancer, these instruments have not been long enough used to give us practical figures as to results; but we can believe from the work of Byrne that we will get better results by this method than by the use of the ligature. There is no doubt, that no one has secured in the United States as good results from hysterectomy for cancer of the uterus as Bryne did with the curette and by cooking the base of the excavated ulcer with the electrical cautery. If that is the case, by doing a wider operation, that is, cooking the tissues outside of the cervix, there is no reason why we should not get better results than did Dr. Byrne without hysterectomy. So far as this particular field for the use of the instruments is concerned, I heartily endorse it.

Dr. Howard A. Kelly, of Baltimore.—This is a most important subject. Many of you will remember that Baker Brown was one of the first to take up the use of the actual cautery for the control of hemorrhage, after which he obtained better results than any of his contemporaries.

I saw Keith, of Edinburgh, in 1887, remove an ovarian tumor by using the time-honored *ferrum candens*. The next in order of time was Skene, whose instruments were made by Pignolet, in Brooklyn. I procured a set and tried them, but they were not satisfactory, as it took too much time to use them and they did not develop sufficient heat. When Dr. Downes' instruments came out, I got them, and found them all I could wish, but unfortunately, I have not been able to instal a satisfactory plant and keep it in working order.

In cancer work I do not like the methods so much, because we have there to work in remote corners in taking out the broad ligaments from the pelvis after freeing the ureter. I feel sure the cautery will not receive as hearty a welcome as it would have done twenty years ago, when technique was less perfect and we had so much trouble with our ligatures. With careful work, there is really little or no trouble with ligatures in these days. If men will be a little more careful in the character of the ligatures they use, will limit still more the use of other instruments. I refer to the advantage of fine ligatures. I am sure

that the average surgeon through our country uses ligatures from two to four times as heavy as they ought to be. Fine silk will control even the large vessels and it is perfectly harmless as it never lodges infection or comes to the surface through a fistulous tract. In my opinion the alternative of the cautery is the wider use of fine ligatures.

I was interested in hearing that Dr. Downes now uses less pressure. With a small pair of crushing forceps I regularly use the Paquelin cautery to cook and to burn off the appendix. I have tested this method by cutting off a sliver of the little translucent stump which is left, and putting it in agar in a tube, when I found that but one culture developed in eleven cases. I think that in this way with the common, ordinary cautery which is in everybody's hands, we may get a satisfactory sealing of the tissues and a good, thorough cauterization in forty-five seconds, thus accomplishing practically what we do with the more expensive apparatus, by taking a little more time.

Dr. O. H. Elbrecht, of St. Louis.—I would like Dr. Bovée in his closing remarks to give us his opinion as to what he thinks caused the late secondary hemorrhage in both of these cases.

Dr. Bovee (closing).—In answer to the question of Dr. Elbrecht, as I stated in my paper, in my judgment the hemorrhage which occurred in these two cases was due to a mild infection, not infection from the ribbon, because I think it would take considerable time to get infection from that source because it is cooked hard. There is more likely to be infection just at the base of the ribbon in the tissues. In both cases, in which a vaginal hysterectomy was done, I found a malodorous discharge from the angle of the wound, and in each case the only treatment I employed was keeping the patient in bed and using vaginal douches for the hemorrhage. In the other I thought it was hemorrhage; it was a case of general infection, which was evidenced by the fact that she had hemorrhage from the intestines and from the stomach at the same time, and probably had a hemorrhage into the abdomen. Two days later I could detect this mass in the abdomen. When I opened the abdomen two weeks later I found a good deal of coagulated blood there, with considerable adhesions above it. There was evidently no attempt to close in the blood clot. I think it is purely a case of infection, and it would happen just as much if ligatures were used as with

these instruments. In fact, it would be more likely to happen.

There is one point in the discussion mentioned by Dr. Kelly as to the use of ligatures, which I desire to refer to. Ligatures do not apply as well in the matter of intestinal resection as do these instruments, because with them we are operating in a perfectly clean field, while in practically any other way we would not feel that we had a clean field to work in.

I sincerely hope that the Fellows of the Association will be sufficiently interested to take up this subject and give these instruments a thorough trial, because I myself feel very much pleased with the results I have had.

AN OPERATION FOR LARGE RECTOCELE.

By George H. Noble, M.D.,
Atlanta, Ga.

It is not the purpose of this paper to consider small rectocele as they can be relieved by ordinary perineal operations. In large rectocele not infrequently there is more or less tediousness, loss of blood in the denudation and certain objections to puckering together, the overstretched and distended tissues and forcing them into the rectum. Furthermore, there are unsatisfactory results from the failure to make a strong and resisting rectovaginal septum.

This operation is presented for the purpose of overcoming these objections. In the technique it will be observed that the rectocele is actually resected, and the strong or normal rectovaginal septum above the weak protruding point is drawn down to the level of the levator ani muscle and securely anchored.

The steps are:

1. A thorough dilatation of the anus and recleansing of the rectum.

2. Denudation of a wide collar, or ring, as it were, around the neck of the rectocele, beginning high up in the vagina and extending downward (from *A.* to *B.* and *C.* to *D.*, Fig. 1) near to the promontory of the rectocele. It is unnecessary to remove the mucosa from the last point mentioned (*I.*, Fig. 1) if the rectocele is very large, as it is cut away in the resection, but the width of the denuded collar should be sufficient to make the lines *A. B.* and *C. D.*, Fig. 1, equal to the lines *E. F.* and *G. H.*, Fig. 3. By pro-

Fig. 1.

Fig. 2.

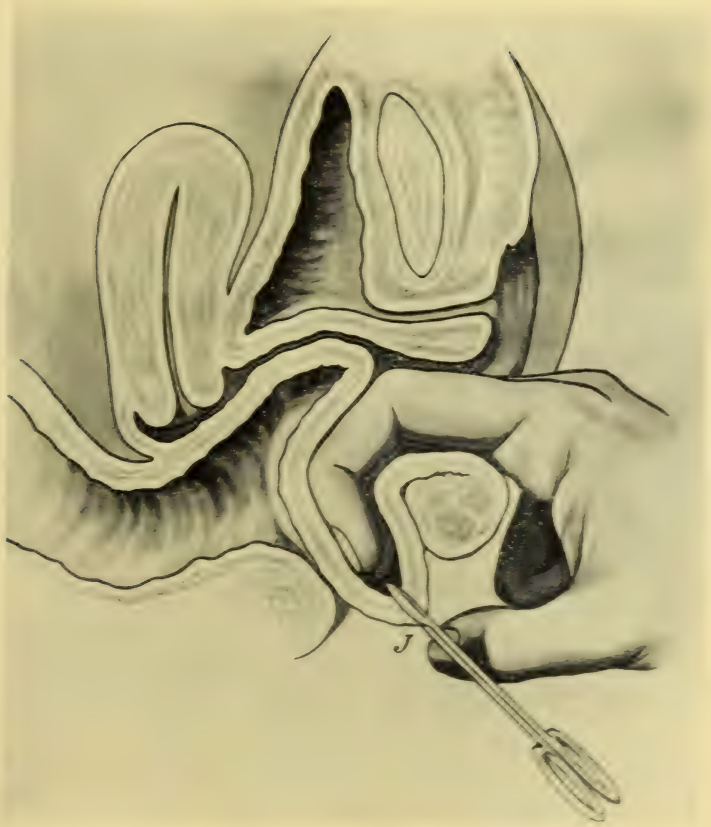


Fig. 3.

ceeding with the denudation from within outward, the veins of the rectovaginal septum are cut through at a high point and secured with compression forceps, thus the necessity of repeatedly clamping the same vessels in the process denudation is avoided.

3. Two fingers are placed on the promontory of the rectocele (*I.*, Fig. 1), carried into the vagina and out through the anus, forcing the rectocele ahead of them, and in this way completely everting it through the anus (see Fig. 2). It is seized with a pair of forceps at the point where it protrudes and is drawn down, step by step, until more or less resistance is felt. In this way the relaxed parts of the rectocele are secured (*J.*, Fig. 2). If in drawing the anterior wall down the normal parts of the rectum do not come as low as the levator ani muscle, the rectum should be liberated by dissecting it from the vagina, which will permit of further descent and allow all of the overstretched tissues to project beyond the anus.

4. A pair of light compression forceps is then placed on the neck of the rectocele just external to the anus for the purpose of holding it in position (Fig. 3).

5. Two sutures, preferably medium-sized kangaroo tendon, are passed through the unruptured portion of the perineum, close to the sphincter ani muscle side to side after the manner Emmet inserts his tension suture in perineorrhaphy. In passing from side to side they should take up the prolapsed portion of the anterior wall of the rectum. When tied, they closely approximate the denuded surfaces represented by the lines *E. F.* and *G. H.*, Fig. 3, and anchor sound and healthy rectum to the levator ani muscle, rectovesical, and deep pelvic fascia.

6. The vaginal side of the wound is completed by doing perineorrhaphy. The protruding rectocele (*K.*, Fig. 3) is amputated about three-fourths of an inch external to the clamp, and the edges of the stump closed with a continuous suture of catgut (Fig. 3).

The case is then treated as an ordinary perineorrhaphy, except that a wet salt dressing is placed over the protruding stump. The latter retracts within a week's time and takes care of itself.

Though I have done this operation only five times I feel that it is worthy of consideration, as the results were perfect.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore.—I am interested in the operation described by Dr. Noble and it commends itself to my judgment.

The plan of closure of the outlet which I have pursued and found successful in cases of rectocele of lesser degree is quite different. I do not think it would answer in a case of extreme rectocele, such as we only rarely see. Even with a moderate rectocele, the ordinary operations are unsatisfactory, as they leave a flaccid, boggy vagina above and the rectocele is apt to recur when pressure is put upon it. In these cases I have been trying the plan long since recommended of making a deliberate denudation of the *levator ani* muscles as they come down from the pubic rami, bringing them together by independent suturing with either a figure-of-eight or a single suture. This shuts up the vaginal orifice to a normal size. This plan has been warmly advocated by Dr. C. P. Noble, of Philadelphia; in moderate rectocele, it is the best operation we have. The ordinary Emmet operation, by double triangular denudation and denudation on the vulval surface, does not take care of a well-defined rectocele; at the same time, such cases are often not pronounced enough for the operation that has been described. In this intermediate class the approximation of the levators seems to work well.

Dr. Charles P. Noble, of Philadelphia.—So far as the extreme cases of rectocele are concerned, they are very rare, and I do not know that I have ever seen cases of rectocele as extensive as the one shown by Dr. Noble, of Georgia.

The question of operations for laceration of the perineum, with laceration of the levator ani and for rectocele has interested me for many years, and in the cases that have come under my care I have found no difficulty in curing them by the method which

Dr. Kelly has mentioned. Where we have a good-sized rectocele, instead of picking up the point just within the hymen, I have taken a point about an inch inside the hymen,the mucous membrane in front and the sides of the crest of the rectocele being dissected away with the sulci denudation. This leaves a large bulging rectocele below the central tip of the vaginal mucous membrane. The loose tissue of the rectocele is disposed of by suturing, which attaches the loose tissue to the levator ani. That is a modification of the typical Emmet operation. The point Dr. Kelly spoke about I worked out quite a number of years ago—at least ten years ago. In the beginning what I did in every case was to split the fascia over the levator ani muscle, so that the muscle of one side could be sewed to that of the other. As a result of that method in some cases I overdid the matter, and instead of restoring the parts to the normal, I had a band of scar tissue across the vagina. Having learned not to overdo it, I stopped splitting the fascia and, if you do not split the fascia, you will restore the parts nearer to normal than when you do so. If one simply sutures the fascia which covers the anterior border of the levator ani muscles, from one side to the other, he will get union of the fascia on the two sides much more nearly normal than if he sewed the muscles. For the last ten years, I have had great satisfaction in disposing of these cases by this method. Anyone who has not paid special attention to bringing the anterior borders of the levator ani muscles below the rectocele will be surprised to see how much better results can be secured in that way.

Dr. Noble, of Georgia, has described to us a method which has given excellent results in his hands, but ten years' experience with my own method has been followed by the utmost satisfaction.

Dr. J. Wesley Bovee, of Washington, D. C.—I find in many of these cases that there is evidence of injury of the septum between the rectum and vagina at a higher point, running up considerably along the posterior vaginal wall. Operations on the lower portion of the vaginal wall are not sufficient. They close the lower part, but we have relaxation of the parts higher up. I have been in the habit of ignoring the tongue of tissue which is shown in the cut Dr. Kelly made in speaking of the classic Emmet operation, and running these denudations perhaps

not quite so far but drawing them to a point well up in the vagina, sometimes carrying it as high as the level of the cervix, and then dissecting back, getting the fascia and bringing it on either side of the median line. One must be cautious in this work not to overdo it, not to draw the fascia so far back on the side as to make a markedly diminished vaginal canal. You can completely shut out the rectocele in this way, and that is proper treatment. The supporting portion of this rectovaginal septum has been destroyed, and you must restore it to have a proper result. This method of procedure is shown beautifully on the lower portion of the perineum and lower portion of the vagina.

I have had some experience with the operation that Dr. George H. Noble has described for large rectocele and have been very much pleased with it. In cases of large rectocele it is very satisfactory and is certainly an ingenious operation.

Dr. Charles P. Noble, of Philadelphia.—I am very much obliged to Dr. Bovée, for what he has said is strictly true. When there is a false bursa between the posterior wall of the vagina and rectum, I have stripped it loose as far back as the cervix. In two instances I have opened the peritoneal cavity unintentionally, in stripping this loose. In those cases in which everything is loose from the uterosacral ligaments down, it is necessary to supplement the work by such a procedure as he has mentioned, and I can also say that by leaving the tip just as it is pictured there and separating it from the rectum, it is quite easy to add that step in the more extreme cases.

Dr. Isaac L. Watkins, of Montgomery.—I have had no experience along the line which Dr. Noble, of Philadelphia, has just been talking about. It seems to me, that the idea of dissecting the mucous membrane away from the rectovaginal septum can be readily dispensed with by simply elevating the vaginal mucous membrane, making an incision at the cutaneous juncture below the edge of the rectocele, and by means of blunt dissection, picking up the vaginal mucous membrane, pushing it up as far as possible, and frequently it is necessary to extend up almost as high as the cervix. That is the only dissection necessary, so far as getting off the mucous membrane of the vagina is concerned. After that has been separated by blunt dissection with finger or with sponge and pushed up, the rectovaginal system tissues will come down, and we have the muscles

on each side, separated by the rectum which projects through it in for hernia. (Indicating.) If this tissue is brought together by means of a continuous suture, beginning in the septum, and sewing from right to left, going over and including the elevated tissue of the mucous membrane of the vagina, we will find we can do away with that separation of tissue which has permitted division of the septum to take place. Virtually, it is a hernia, and if this tissue is brought in apposition and kept there, we will get rid of the rectocele, and will do so without any scarring, or without any wasting of time. After that has been done, after you have taken a few stitches, you will find redundancy of mucous membrane in the vagina. This will have to be removed by a V-shaped point which leaves the operation very much like the operation of Dr. Noble, of Philadelphia, excepting the method of putting in the stitches before the removal of the V-shaped piece is considered. It is about the same method as Dr. Noble has suggested. It has to be done with care, otherwise we will not get the desired results. We should put in one suture at a time, tie it, and then put in another; if we put in too many sutures, we will get too much tension; we will narrow the vagina, and this is the most difficult part of the operation unless you operate carefully.

Dr. George H. Noble (closing).—I purposely avoided saying anything about perineorrhaphy, because a volume can be written upon that subject alone before it is presented to the profession in a satisfactory manner.

I will state, however, that in small rectocele, in the place of making the denudation in the vagina on either side of the rectum, after the manner of Emmet's operation, I remove the tongue-like process of mucous membrane overlying the protruding rectocele. The rectocele is then pushed back and the vagina closed in front of it. If there is much relaxation, or protrusion of the rectum, I draw down all the relaxed tissues and stitch them to the recto-vesical fascia immediately in front of the anal segment of the rectum. The object of this step in the operation is to anchor unstretched rectovaginal septum to a more or less fixed point on the floor of the pelvis and at the same time behind the perineum far enough not to interfere with direct approximation of the rectovesical and deep pelvic fascia and levator ani muscle.

In reply to Dr. C. P. Noble's suggestion that cutting the edges

of the levator ani muscle and stitching its several ends across the perineum might constrict the vagina, I will state that such a thing cannot occur unless the muscle is carelessly cut too deep, or too high up. In my operation, however, the muscle is incised close to the side of the anal segment of the rectum and a small bundle of muscle is united just in front of the point mentioned.

I will add that as far as perineorrhaphy is concerned, the best results cannot be secured without suturing together the edges of the rectovesical and deep pelvic fascia and incising the pubo-rectal portion of the levator ani muscle and uniting the cut ends in front of the rectum.

STARVATION AND LOCKING THE BOWELS FOR FROM TEN DAYS TO TWO WEEKS IN COMPLETE TEAR CASES.

By Howard A. Kelly, M.D.
Baltimore, Md.

The laws of nature know no big or little events, but operate alike in all, and to the law of gravity it is all one whether an avalanche of rocks slides down the mountain slope or a little grain of sand rolls onward in a stream in its journey oceanward. So, too, in our surgical work, the greatest laws are equally in force whether we look upon the case as large or small.

Philosophizing in this way I lay before you a few facts which I have worked out within the past four years, wondering whether they do not contain some principles of widespread applicability. Let me at once say emphatically, that while I myself prefer to manage my complete tear cases in the way I am about to describe, and while I believe it is the best way to manage them, it is not for this reason that I come before you; and I do not care a straw whether you adopt this plan or stick to the old method of securing a movement as early as the second or third day. I do, however, want your philosophical minds to grasp the facts I shall lay before you, and to see if you find in them anything suggestive, reaching perhaps into wider and more important fields.

I have before me a list of complete tear cases numbering twelve, one rectovaginal fistula, and two other bad injuries to the rectum in men, involving an extensive loss of sub-

stance of the posterior lower bowel from tuberculosis, treated since October 10, 1901, in my private hospital in Baltimore. The method of operation used in the tear cases was for the most part that of turning down an apron, so as to avoid passing any sutures in the bowel surface, and dissecting out and suturing independently the sphincter muscle with buried catgut sutures, as well as splinting the sphincter with a silkworm-gut suture, transfixing it just back of the ends, and passing up through the septum.

I had had one failure in an old case, which became unmanageable just before the first case on this list came into my hands; and when my old friend and classmate, Dr. Harry Whitcomb, of Norristown, Pa., brought me a rectovaginal fistula which had had repeated operations with failure, I resolved to carry through a new plan, namely, that of giving the bowels perfect rest and ensuring an easy movement at the end of about ten days, without risk to the tender wound area.

The operation was done October 10, 1901, after a thorough evacuation of the bowels. Following the operation no food was given for twenty-four hours.

The patient then received two drachms of albumen in water at 9 and at 11.45 P.M.

On the third day she received two drachms of albumen on an average every three hours.

On the fourth day, after receiving two drachms every three hours for five times, she took four drachms the remaining three times.

From the fourth day on she received four drachms every three hours until the tenth day, when I gave an oil enema; and the following day I administered two drachms of licorice powder, followed the next morning by another oil enema, which in turn was followed by two drachms of the sulphate of magnesia, after which she had a large, partly formed stool, with no scybala.

The result of the operation was perfect.

In some of the earlier cases the diet was occasionally varied

with one-half ounce of beef-juice or chicken-broth, or two ounces of peptonoids; but it soon became evident that the patients did best and that there was less difficulty with the bowels on albumen alone, and this has for some time past been consistently adhered to.

The total amount of albumen taken by a patient who is thus locked up and put on limited diet during a period of ten days is one quart and thirteen ounces, and the amounts average as follows: 1st day, nothing; 2d day, 12 drachms; 3d day, 24 drachms; 4th day, 36 drachms; 5th day, 48 drachms; and from the fifth to the tenth days, 48 drachms, or 6 ounces daily, making a total of 45 ounces, or one quart and 13 ounces in ten days.

The bowel is moved at the end of the period by giving a half-ounce of licorice powder, and this is followed by an oil enema, in some cases, and, perhaps, the next morning by a half-ounce of salts.

The most important factor in securing the first evacuation is to have the patient lying on her side in the Sims position, so as to obviate straining. The nurse then takes one of the kidney shaped pans, or a triangular pan, and receives the movement as it comes. One of my patients got on to a large bed-pan in this position. It is also possible to use a rubber sheet and plenty of gauze and let the evacuation pass into the bed.

As soon as the bowels move I give broth, beef-juice, or wine-jelly for twenty-four hours, and then a soft-boiled egg and creamed sweetbread; after this, bread, toast, and soup. I keep the patients in bed, as a rule, for eighteen days.

To follow out this plan of treatment takes much moral courage, as the patient at first begs and even cries for food.

Let me now review a few of my cases: One had been torn as a child by an accident; several had had repeated operations; one had been torn for twenty years, and before the operation was very feeble and believed to have pulmonary trouble. She has since grown fat.

One had an extensive complete tear, and, in addition, the whole base of her bladder had dropped out.

One, a man, had had repeated operations for tuberculosis, with great loss of tissue and extensive cicatrices; he had been taking forty grains of morphine daily, and had to have thirty-three grains of morphine hypodermically for ten days after the operation. He got well, with a fistula, and had to be operated on again for this.

Another patient was a very frail little woman, but she kept up her starvation diet for ten days, and did splendidly.

The next on the list was an elderly woman, who fretted much over such unusual treatment, but kept up the diet for twelve days.

Again a very feeble little wisp of a woman stood it for ten days, and left my care in three weeks with a good result.

Let me close by giving a little more detail relative to the last two cases. One was a patient, operated upon in the intermediate period, for a recent complete tear, whose tissues were very friable, and in a most unsatisfactory state for plastic work, where I was obliged to do the old Emmet operation of suturing on three surfaces, rectum, vagina, and perineum. At the end of twenty-four hours she received a drachm of albumen every two hours, increasing this amount by one drachm every day until the fifth, when she took half an ounce. She was kept on this amount until the eleventh day. On that day the bowels were moved with licorice powder, followed by an oil enema, introduced with a soft rubber catheter, securing a large soft movement in the side position.

Lastly, Mr. H. was operated upon November 14, 1905, for an extensive defect in the posterior rectal wall, extending from the sphincter, which was divided up to the third sacral vertebra. I had removed the lower vertebræ, as they were involved in the tuberculosis process.

As rest was of the utmost importance to the thin line of sutures extending from up under the sacrum down to and

including the sphincter, I kept him on the restricted starvation diet with locked bowels for fifteen days.

On the fifteenth day, he was given one-half ounce of licorice powder, followed in six hours by four ounces of cotton-seed oil by enema. Eight hours later he had a free soft movement, and now has good union, with perfect control over his bowels.

He did perfectly well on the diet, and never at any time seemed exhausted.

One of the inherited gynecological traditions runs to the effect that if you lock up the bowels you are sure to have scybala, and when these pass they will tear open the wound. This can be controlled by diet. If you give milk you will have scybala, but not with albumen.

I have brought before you to-day an old thought in a slightly new form, presented, perhaps, with a little more precision and method.

I would suggest in conclusion that you consider the following facts:

We have been considering two things, a most restricted diet and an obstipation extending over a period of from eight to fifteen days.

I would suggest to you as surgeons that we give closer attention to the value of this restricted diet, limited to nature's most highly concentrated nutriment, egg-albumen, which leaves almost no ashes in the bowel.

It may prove of value to us in dealing with the various forms of indigestion which we meet in association with our work; it will surely be of value in all plastic operations on the intestinal tract. I have used it with great effect recently in reducing an umbilical hernia in a very stout woman.

It may prove of value in treating hysterical patients, as an adjuvant to those other forms of treatment which we use in our efforts to aid the patient to strike a new balance with her nervous system. One thing is sure, nutrition must be profoundly affected by such a diet, and when we begin to supply

nature's cry for more food,we may with massage,cold douches or spongings, followed by active exercise, succeed in diverting nutrition into old unused channels, and so build up the nervous system.

The locking up of the bowels is of value in plastic work about the rectum, and the limited diet in so far as this class of cases is concerned is incidental. One point, however, is established here, and that is that the patient may have a perfectly easy, soft movement even after shutting up the bowel for ten or fifteen days.

DISCUSSION.

Dr. Henry T. Byford, of Chicago.—I hardly know whether I understand Dr. Kelly's intention or not; whether he recommends this method for all cases or only for the worst ones. Since adopting the flap-splitting method of Tait I have not had a failure. Some of the severe cases must have escaped me, I suppose, but not all.

I have kept patients on several ounces of egg-albumen a day, and I agree with Dr. Kelly that it is a good thing to make them lose flesh. In thin or spare patients we should not institute an after-treatment which will cause them to lose too much flesh unless it is really necessary, which is seldom. After forty-eight hours I have always found it safe to move the bowels, and do not see why it is necessary to practically starve a patient for ten days on account of the perineorrhaphy, although I am a great believer of starvation treatment for other conditions.

The point I wish to make is that while it may be a good thing to advise and carry out what Dr. Kelly recommends, in the cases that really require it, in the ordinary case I should say it would hardly be necessary. Of course, I may have misunderstood Dr. Kelly's intention in recommending this subject.

Dr. Geo. H. Noble, of Atlanta.—It has been my custom to stop the bowels in cases of complete laceration of the perineum for five or six days, and in cases of incomplete laceration for four days. If the wound is free from infection, union of the parts is then sufficiently strong to permit evacuation of the bowels by aid of an enema. I have not adopted the lateral

position for evacuation of the bowels, as it is not a pleasant thing for the patient, but my patients are instructed not to make any straining or expulsive effort at all, for fear that the bowels may move before the fecal masses have been thoroughly softened. If there is any difficulty in the evacuation of the bowels, oil and glycerin, or oxgall injection, are repeated until the rectum is completely emptied. Digital examination by the vagina may be resorted to for the purpose of detecting or breaking up scybalous masses. The diet is confined to fluids; egg-albumen mainly, buttermilk, and peptones are also used, etc.; sweet milk excluded.

I do not feel that it is prudent to prolong the starvation diet and lock up the bowels for as long a time as Dr. Kelly recommends in the after-treatment of all cases, for anæmic and poorly nourished women do not stand starvation well. The advantages of such treatment, therefore, may be outweighed by the effects of lack of nourishment. However, it may be worthy of consideration in plethoric subjects.

I had some experience with the apron operation mentioned by Dr. Kelly. It was about the time Dr. J. Collins Warren presented it in a paper to the American Gynecological Society (1882). The objections are tediousness in desection of flaps, turning cicatricial tissues into the rectum, inability to secure ample flaps in bad cases, and tendency to sloughing of flaps made up largely of scar tissue. But in slight tears it effectually shuts out infection from the rectum, and is a decided improvement over the rectal suture. The length of the flap must be equal to or a little longer than the extent of the laceration. In bad tears it is sometimes difficult or impossible to secure flap enough to reach to the anus and in lacerations extending around one side of the rectum and entering the anus near the posterior border this method is impracticable. The simplest operation is the one I presented to this Association a few years ago, that of dissecting the anterior wall of the rectum from the vagina and pulling it down through the anus. In this way a flap is made that completely shuts the rectum from the vagina and converts a complete into an incomplete laceration. The operation is easier to do in a bad tear than in a slight one, because there is less lateral tension. Deeper the tear, greater the distance along its borders and wider the flap, consequently, more room for manipulation and pulling down the

anterior wall is secured. All cicatricial tissue is cut away and no unhealthy mucous membrane is turned into the rectum. The uninjured wall just above the innermost extremity of the laceration is drawn low enough to extend beyond the sphincter ani muscle, consequently the liability of extravasation of fecal matter or infection from the rectum into the wound is prevented. A normal rectovaginal septum is secured.

Dr. Charles P. Noble, of Philadelphia.—So far as this operation of Dr. Kelly's is concerned, I must confess I belong to the conservatives. I should be interested to know what results are secured by these operations. I cannot say that I have never had a failure. I have had them but the percentage of failures by the principle of the Emmet operation, plus direct suture of the sphincter ani muscle, which is an addition to the original Emmet operation, is small. Probably one in fifteen or twenty cases will be failures, while the rest will be successes. I have never seen anybody report any actual results by the flap methods, and as they have never appealed to me as being artistic, and as having a flap hanging out of the anus which sloughs off is rather repugnant to my surgical sense, I have never adopted these operations. I would like to know, if possible, how many flap operations Dr. Kelly has done, and what were the results he secured. We ought all of us to be glad to welcome any improvements.

So far as the question of diet and locking up the bowels is concerned, I have had some experience with it. Some years ago, I did the ninth operation on a woman. She had had the eighth sphincter operation before I saw her. So it is very clear that by the classic technique somebody gets failures, as there were eight in this one case. As a result of the eighth operation there was a great deal of scar tissue present. In that case I adopted the plan of locking the bowels for twelve days, but I did not restrict the patient to a diet of albumen, although that was the major part of the diet. She was given coffee, alcohol, peptones, etc. Egg-albumen was the principal diet. We avoided milk. We had a perfect result. The result pleased me so much, after there had been eight failures, that I determined to try the locking-up-starvation plan systematically for a while. I tried it in four or five cases, but the fifth patient came so near dying from the plan that I abandoned it. This patient had a

violent acute autointoxication and almost died from prostration. She had a violent diarrhœa; her pulse was almost uncountable; it took active stimulation and hypodermoclysis to keep her from dying from autointoxication, and you may rest assured that I was not so much in love with that plan as I had been before. The method I have used is almost old fashioned, in that I move the third day after operation, and then every two days until a week is up, and then every day, and the best results I can claim for that method of after-treatment is one failure in twenty cases.

Dr. O. H. Elbrecht, of St. Louis.—In one case after two or three days of purgation I succeeded in locking the bowels for eighteen days. I thought they should be locked as long as she could stand it for she had been subjected to perineorrhaphy unsuccessfully twice before, and there was a great deal of scar tissue as a result, and I felt that success would depend largely upon locking up of the bowels, because there was so little healthy tissue to depend upon. I told the woman about this and what I intended doing, and she agreed to stand it as long as necessary. While her bowels were locked she received nothing but liquid diet, such as orangeade, lemonade, broths and plenty of whiskey. On the eighteenth day her temperature arose to 101°, and I thought she was then beginning to get an autointoxication, but up to this time she did not feel in the least distressed or uncomfortable and there was no impulse or tendency for her bowels to move. She was then given castor oil and several good bowel movements followed and her temperature was normal on the following day. She was a very small woman, not weighing over 110 pounds, of a highly nervous temperament and all in all an unfavorable subject to try this treatment on. However, I felt justified in trying it from the fact that her two previous operations had been unsuccessful and she was so anxious to try it again and fortunately obtained a very perfect result. I do not believe that we are justified in using this method in the ordinary cases of perineorrhaphy for we usually obtain good results without it, but I do believe where the results are not perfect by the first operation, that we are justified in adopting it for the second and lock them as long as there are no symptoms of auto-intoxication.

Ten or twelve days are usually sufficient to accomplish the result desired.

Dr. Charles M. Rosser, of Dallas.—I have had no experience with the flap method described by Dr. Kelly, but as indicating that some such method is most desirable, I wish to relate briefly a case which I consider of some interest. I will state that when the patient was three years of age her insane mother, with scissors, made a complete severance of the rectovaginal septum, a clean cut extending back a distance of two inches. Five years later the child was brought to me for treatment. The child's mother was insane and those caring for it were ignorant of the injury and supposed that the symptoms were from diarrhœa. Repair in this case was difficult. There was but little development of the sphincter ani, and the levator ani was rudimentary, making doubtful results. The method I employed consisted in making two flaps, dissecting as near the rectum as possible on either side, a little beyond the distance of the cut leaving the flaps toward the vaginal correction so as to lose no tissue at all, and depending upon the further development of the child to correct any deformity that might exist. Sutures were inserted from below in a small delicate line, coaptating the structures above, care being taken to produce just enough tension to cut off the space but not enough to cause pressure necrosis. The result from this operation was very satisfactory. A year afterward I did an operation for the purpose of restoring a better condition of the vagina. The later condition of the parts is satisfactory in appearance, and she is arriving at the age of puberty.

Dr. Charles L. Bonifield, of Cincinnati.—I have had no experience in performing operations by the method described by Dr. Kelly, but I have had some experience in performing an operation similar to that described by Dr. Noble, of Georgia; simply separating the rectum from the surrounding structures and bringing the upper end of the tear down to the sphincter ani muscle. I think this is one of the simplest, one of the easiest, and one of the most satisfactory ways of repairing these tears that extend up into the bowel. By this method we absolutely preclude any danger of leakage high up in the perineum. If we have any leakage at all it is under the skin; it will be a simple fistula, and this will heal after cutting it out.

As to the starvation diet, I never carry it to the extreme Dr. Kelly has advised, and, it seems to me, this is more interesting

as a physiological experiment than as a thing we should recommend in the ordinary run of cases. When I began to do gynecological work all of these cases were constipated from seven to ten days. However, it was not very long before we realized that perinei were torn to pieces with movements of the bowels, when they had been long constipated. It has been my rule in these cases to move the bowels on the fourth or fifth day after operation, and after limiting the diet up to that time. The best means I have found for securing liquid movements of the bowels is to give an injection of oil, as one of the gentlemen suggested, to start with, or to begin with small doses of calomel. I think calomel by causing bile to be poured into the bowel has more to do with dissolving scybalous masses than salts or anything of that kind we may give.

Dr. Guy Leroy Hunner, of Baltimore.—I told Dr. Kelly on the train in coming to this meeting that his paper would elicit a good deal of discussion.

As to the method of turning down a flap, Dr. Noble has asked Dr. Kelly for his results from this method. Perhaps it will be just as satisfactory to Dr. Kelly to have one of his associates speak a word for the results after this method.

Dr. Kelly says for a time before we began trimming off the excess of flap there was a little suppuration of the anæmic distal portion; but so far as the ultimate results are concerned we have never had a result that would speak against the method. Those of you who have dissected up and loosened the bowel, as Dr. Noble, of Atlanta, has recommended, and brought it down know how apt you are to get a tear of the edge of the bowel, a fraying of the mucosa of the edge of the bowel, with the vaginal flap turned down on the anus, there is danger of infection from the rectum itself, and the flap is the most satisfactory for handling and for working with, because the vaginal mucosa will not fray and tear as does the edge of the rectum. When you are through with the sphincter and levator ani muscles and pelvic floor there is no reason why the excess of the flap should not be cut off. I have not had any trouble after cutting off the flap by having any of the wound presenting on the anal surface. I manage the flap so as to have the entire wound on the perineal rather than on the anal surface.

As Dr. Kelly has stated, his associates in the Johns Hopkins

Hospital, and after they leave the hospital, have ordinarily followed the usual plan of moving the bowels on the third or fourth day after this operation. That has been my custom, and I have seen no reason to depart from it. I have had one failure from a repair operation, but I do not think I could ascribe it to the fact that the bowels were moved too early. There are some cases in which we do resection of the bowel low down in the pelvis and bring the ends together, particularly in cases of pelvic tuberculosis with involved bowel, where we cannot always get completely normal tissue to suture end to end. In such cases it would be very desirable to leave the tissues at rest for as long as possible. On the other hand, those are the very cases in which we ought to rapidly build up the patient's strength, and so we have the problem here that each of us will have to settle as his theories, rather than his experience dictate.

Dr. Kelly (closing).—I wish to thank the Fellows for their free discussion of my paper, although some of the remarks were a digression. I wanted to emphasize the specific point that some patients can be fed on such a limited diet for seven to ten days as to produce very little ash in the bowel, and that the bowels would, in consequence, move readily afterward. I thought the method might have a wider range of applicability than in the few cases in which I have used it. I would suggest the possibility of taking patients with disordered nervous systems and disturbed nutrition, who are living irregularly at home, and by treating them in this way, striking a better balance with nature for them than they had before, so that after these operations they may have much better general health.

As to the failures of this method I recall one in the wife of a doctor in Pennsylvania. She went through my hands. I operated on her and failed. Subsequently, she passed into the hands of a friend of mine who, with great confidence, undertook to operate, but obtained a similar result.

I would call attention to the importance of using the lateral position in emptying the bowels in such cases, because a patient cannot strain much while in that posture.

Dr. Noble's suggestion to work up this group of cases and report them *en masse*, and see what results we have obtained, is a good one. Dr. Byford declares we have not been having failures by the old way; my experience teaches me that oper-

ators are having failures everywhere, and not only are wounds breaking down extensively, but patients come back to us worse than they were before, because of the tissues which have been cut away. And even when there is a good skin and perineal union, a digital examination serves to show that the sphincter is not united.

On palpating the septum you will find a thin-edged scar tissue, and you will be able to feel the bunched-up sphincter behind and at the sides; and, although operators may have had good success in such cases, whenever those patients have had trouble from loose bowels or from gases passing they have been unable to exercise due control. I repeat, there have been many failures by the old operation of bringing the parts together, as depicted in Emmet's book. In many cases reported as successful the sphincter ends did not come into apposition; a large percentage of them were, therefore, failures.

ON THE SURGICAL TREATMENT OF CANCER OF THE HEAD AND NECK.

WITH A SUMMARY OF ONE HUNDRED AND TWENTY-ONE OPERATIONS PERFORMED UPON ONE HUNDRED AND FIVE PATIENTS.

By George W. Crile, M.D.,
Cleveland, Ohio.

Owing to the fact that no other treatment has offered as much as the operative; that there are immediate dangers in the operative field; that there has been a hitherto high mortality and low permanent cure rate and that in many instances death comes in its most horrible form, the surgical treatment of cancer of the head and the neck has ever taxed the courage and the ingenuity of the surgeon, and since the beginning of surgical history has held its place as one of the most serious of surgical problems.

No surgeon of to-day can hope to surpass the technical skill and gross anatomical dissection of such masters as Langenbeck, Billroth, Cooper and a host of others. It would seem, then, that the problem must be attacked from new standpoints and new surgical resources must be added if the treatment of cancer of this field is to make as great advances as have been made in the surgical treatment of cancer of the breast.

In this paper it is intended to present the practical application of some researches on certain of the problems incident to the operative technique of this field and certain conclusions drawn from a personal experience in one hundred and

twenty-one operations for cancer of the head and neck performed upon one hundred and five patients. In the prosecution of the research problems in the laboratory and the clinical problems in the operating-room I have to acknowledge the constant co-operation and valuable assistance of my associate, Dr. W. E. Lower.

The etiology, diagnosis, pathology, complication, after care and the many problems of surgical pathology and physiology, the treatment by other than surgical means and the treatment in any other than the curable period will not be here considered.

We shall base our arguments largely upon the assumption that cancer is primarily a strictly local disease; that therefore accessible cases are at some period curable by complete excision; and that the immediate extension from the primary focus is through the regional lymphatic system. By a careful study of 4500 cases from their original report in literature, made for me by Dr. Hitchings, in less than 1 per cent. have secondary foci been found in distant tissues or organs. From this we conclude that cancer emboli are infrequent and that the collar of lymphatics of the neck form an extraordinary barrier through which cancer rarely penetrates. Virtually all the lymphatic glands of the head and neck are found in this collar, hence in this collar the regional metastases of cancer of nearly all the tissues or organs occurs. This collar is located between the skin and the deep muscular planes of the neck from the lower jaw to the clavicle, but is mainly massed on the lateral sides along the great veins. It is therefore almost entirely surgically accessible.

Paired organs or distinctly one-sided foci usually metastasize quite regularly, while unpaired organs, as the tongue, or the mesial tissue, such as the nose and the middle of the lip, metastasize irregularly.

After the lymphatic stream has been blocked by carcinomatous invasion it may flow in any direction and all sort

of irregularity in the further metastases may follow, but always somewhere within the accessible lymphatic collar.

After all, how much more favorable such distribution is than that of certain other organs, as for instance the breast with its thoracic and abdominal metastases; the stomach and intestines with their inaccessible retroperitoneal metastases.

What then is the best method of attack? An incomplete operation disseminates and stimulates the growth, shortens life and diminishes comfort. Local excision of the primary focus only is as unsurgical as excision of a breast leaving the regional glands. Excision of individual lymphatic glands, as one would excise a tubercular gland, not only does not afford permanent cure but is usually followed by greater dissemination and more rapid growth. Judged by analogy and experience the logical technique is that of a block dissection of the regional lymphatic system as well as the primary focus on exactly the same lines as the Halstead operation for cancer of the breast. Such a dissection is indicated whether the glands are or are not palpable. Palpable glands may be inflammatory and impalpable glands may be carcinomatous. A strict rule of excision should therefore be followed.

Next in importance of the block regional excision is that of a strict avoidance of all handling of carcinomatous tissue so long as the lymphatic channel remains intact for the further dissemination of the growth. Retraction should be entirely on sound tissue and blunt dissection should be the exception.

What are the immediate dangers attending the execution of such operations? Infection, local and bronchopulmonary, stand first; then hemorrhage, shock, collapse, and exhaustion.

Infection. In the present status of surgery infection may be dismissed without discussion in all clean dissections of the neck in which the wound does not communicate with the

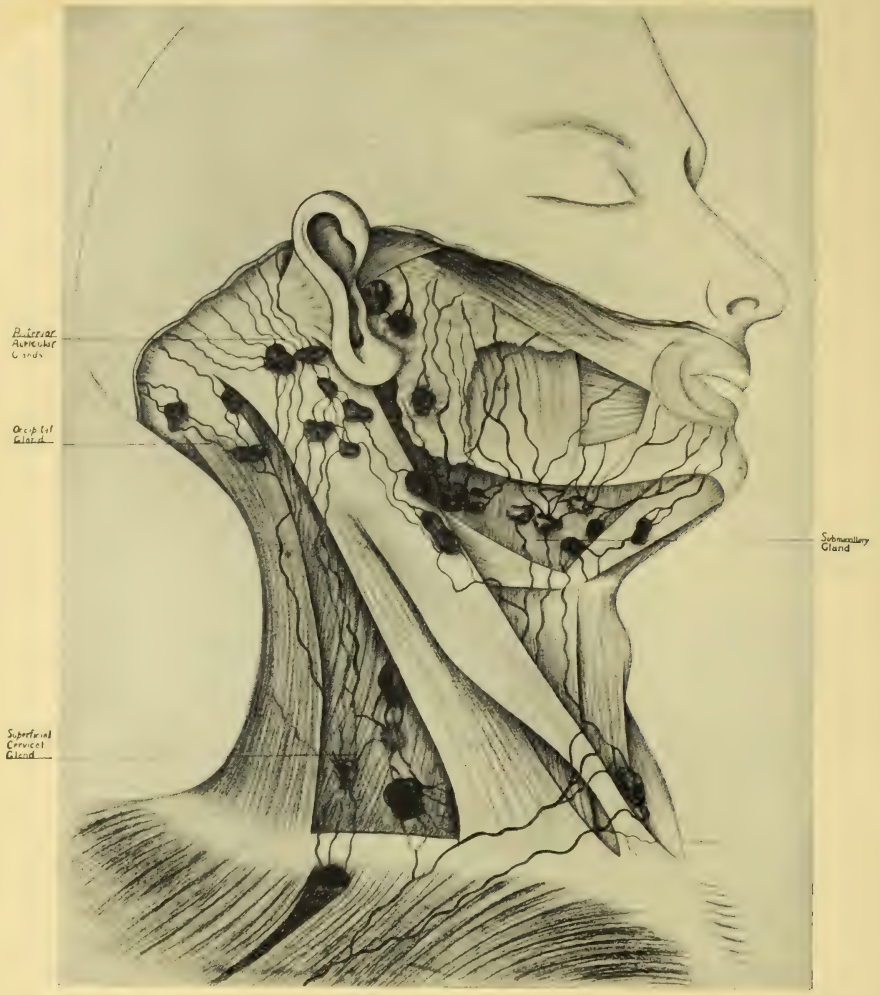


FIG. 1.—Reproduction from Gray to emphasize the distribution of the superficial lymphatic glands.

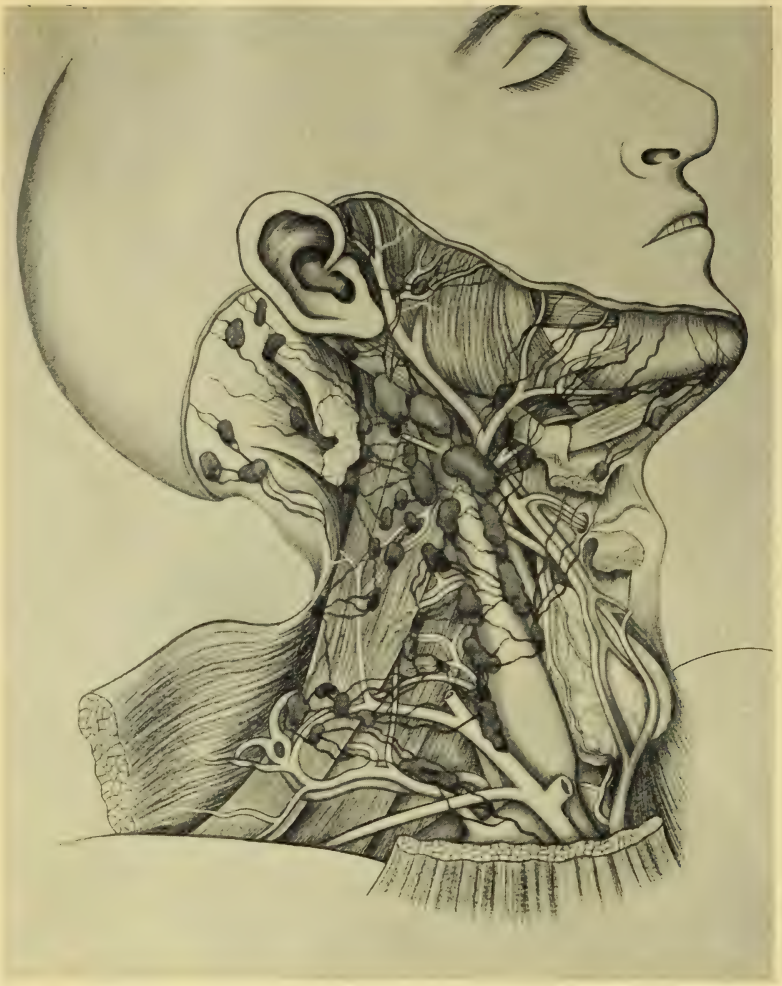


FIG. 2.—A composite plate to show how numerous are the lymphatic vessels and glands in the deeper plane of the neck and how intimately they mingle with the deep jugular and its branches, again emphasizing the principle that to completely excise the local lymphatic system the local and intermingled venous system must be at the same time excised.

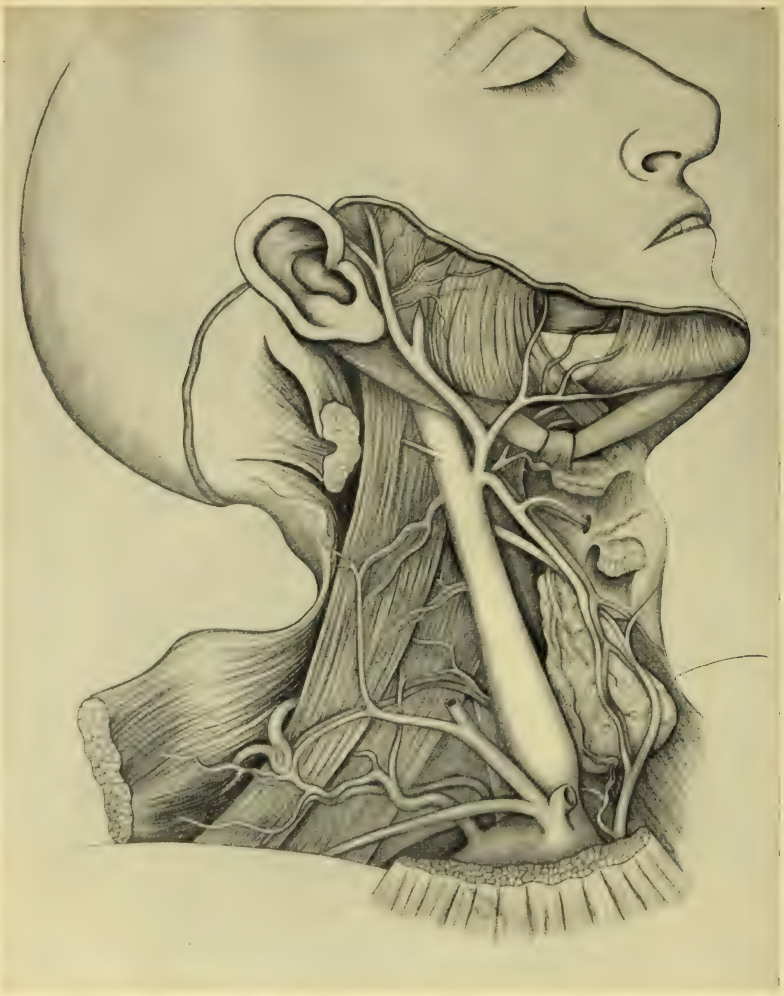


FIG. 3.—As a reminder of the difficulty of doing a complete untrammelled "bloc" dissection with the jugular and all its branches running through the very field that should be excised. The more effective and simpler plan of dissection involves the entire excision of this troublesome venous tree along with the glands. (From Gray.)

mouth, the air-passages or the œsophagus. The greatest infection risk exists when an extensive dissection wound of the neck communicates with the mouth or the air-passages, as in cancer of the tongue or of the larynx. In the latter instance experience has emphatically taught us that the primary wound in the neck should not be made at the same time that the larynx is excised. A preliminary tracheotomy is doubly indicated, as aside from the short-circuiting of respiration and fixing the trachea it produces a wall of protective granulations across the top of the dangerous mediastinal area. After the establishment of this barrier, together with the superficial treatment of the stump of the trachea, but little risk of bronchopulmonary infection remains.

In the case of the tongue the operation is best made in two stages. It is now well known that the immediate and perhaps one of the most important factors in the causation of bronchopulmonary infection in operations within the mouth is the inspiration of blood at the time of and after the operation. This may be absolutely prevented by the adoption of a simple method heretofore described by me in the *Annals of Surgery*. The method consists of passing closely fitting rubber tubes through the nares into the pharynx, then, after drawing the tongue well forward, packing the pharynx with a large piece of gauze. With the exception of operations requiring the removal of the entire base of the tongue, complete control of blood inhalation is thereby accomplished. Incidentally this separates the surgeon and the anæsthetizer, permitting each to do his work unhampered by the other. Mucus that might otherwise collect in the throat is at once absorbed by the gauze packing. The prevention of vomiting is almost wholly under the control of an even anæsthesia. The many other features of the prevention of infection will not here be considered.

Hemorrhage. The control of hemorrhage is important on its own account and almost equally on account of the maintenance of a dry field, affording opportunity for a clean

and precise dissection. The arterial hemorrhage is best controlled by a temporary closure of the common or of the external carotid artery. Permanent closure of the common carotid, on account of the high percentage of cerebral softening in the cancer period of life, should be avoided. Permanent closure of the external carotid, while it is not attended by this risk, involves approximately a 2 per cent. mortality rate from the washing away of the thrombus of the ligatured stump, causing cerebral embolism. At all events, it is unnecessary. In sixty-one cases I have for various purposes temporarily closed the common or the external carotid without immediate or remote complications. Proper closure of this vessel should be attended by little more risk of thrombosis or embolism than closure by tourniquet or by pressure applied on the skin. This part of the technique must be done with the greatest gentleness, the lumen merely closed, the walls not compressed. The troublesome venous hemorrhage may be minimized by placing the patient in a partial upright posture with a sufficient even pressure upon the lower extremities and the trunk up to the costal borders to prevent gravitation of the blood. Probably the most convenient means for accomplishing this is by the rubber pneumatic suit. By this device almost any posture may be assumed without producing cerebral anæmia by gravity. It is interesting to note the collapse of the veins as the patient is taken from the horizontal to the head inclined posture. In atheromatous subjects, with high blood pressure, I have seen marked hemorrhage, even pulsating hemorrhages, from the branches of the external carotid artery when the common was closed. This is easily demonstrated to be due to the passing of the blood of the opposite artery through the brain, causing a reverse stream through the internal carotid of the clamped side to the bifurcation of the common, then up the external carotid causing pulsating hemorrhage from the branches of the latter. When this occurs, as soon as the external has been exposed

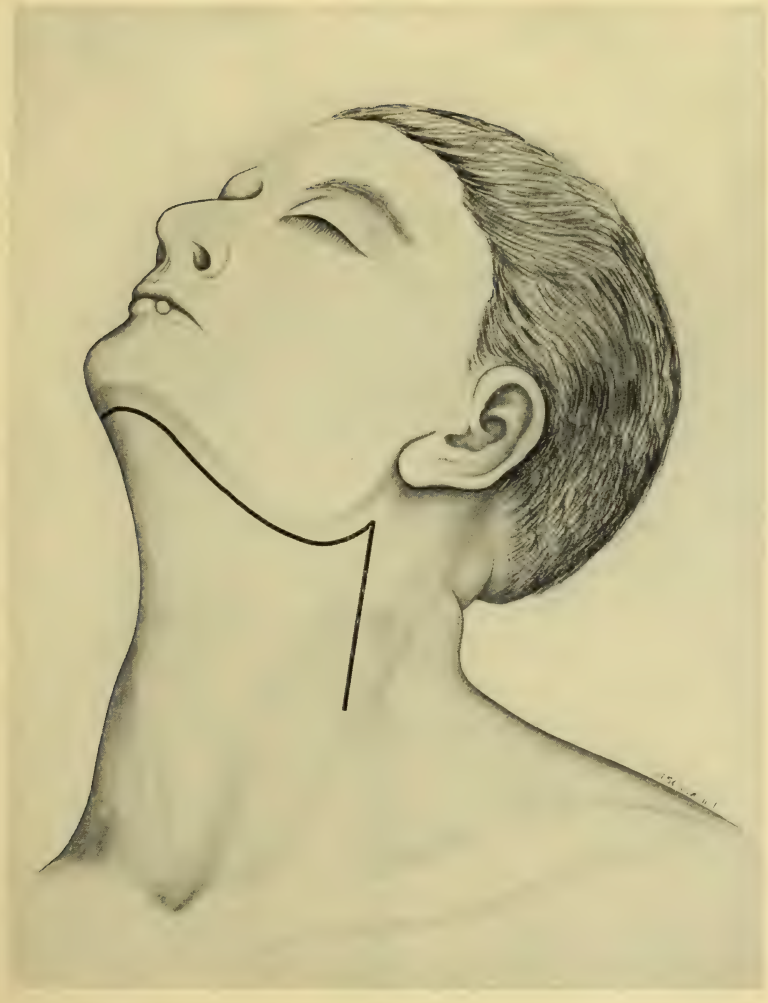


FIG. 4.—Case of cancer of the lip with no palpable glands. The incision in unilateral cases is begun past the median line of the opposite side, carried across under the shadow of the jaw, then extended downward, thereby when the skin is deflected in all directions the lymphatic gland draining area will be exposed.

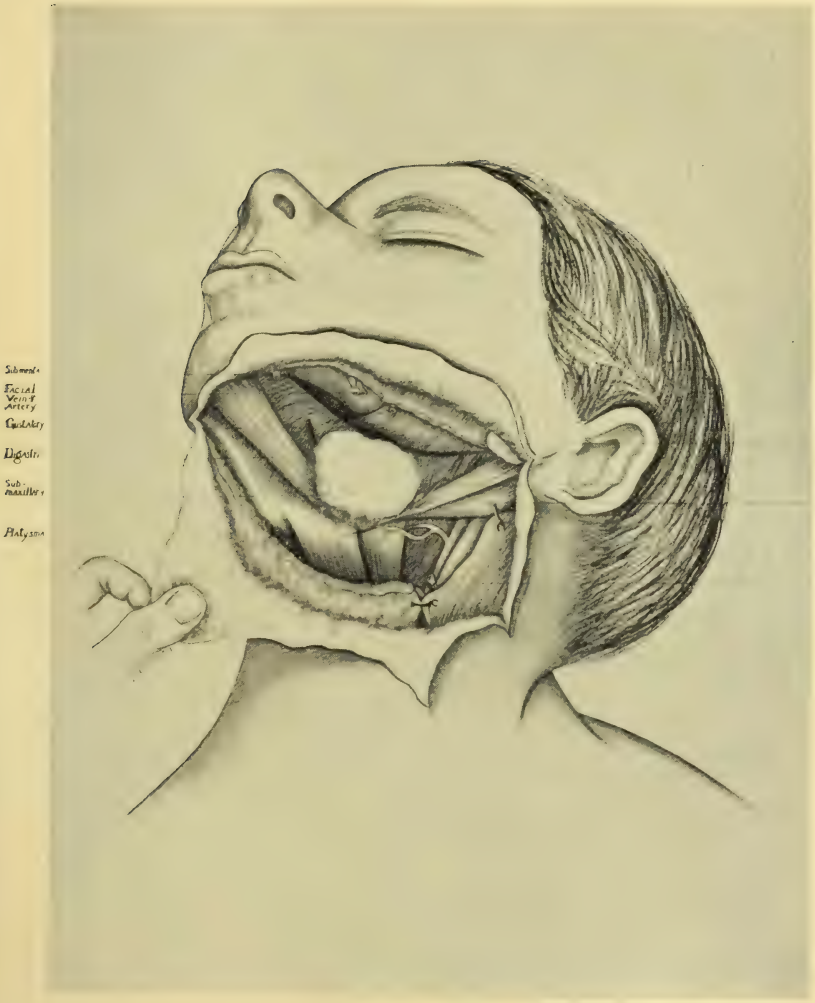


FIG. 5.—Completed local "bloc" dissection (drawn from life) in a case of cancer of the lip though no cervical lymphatics were palpable.

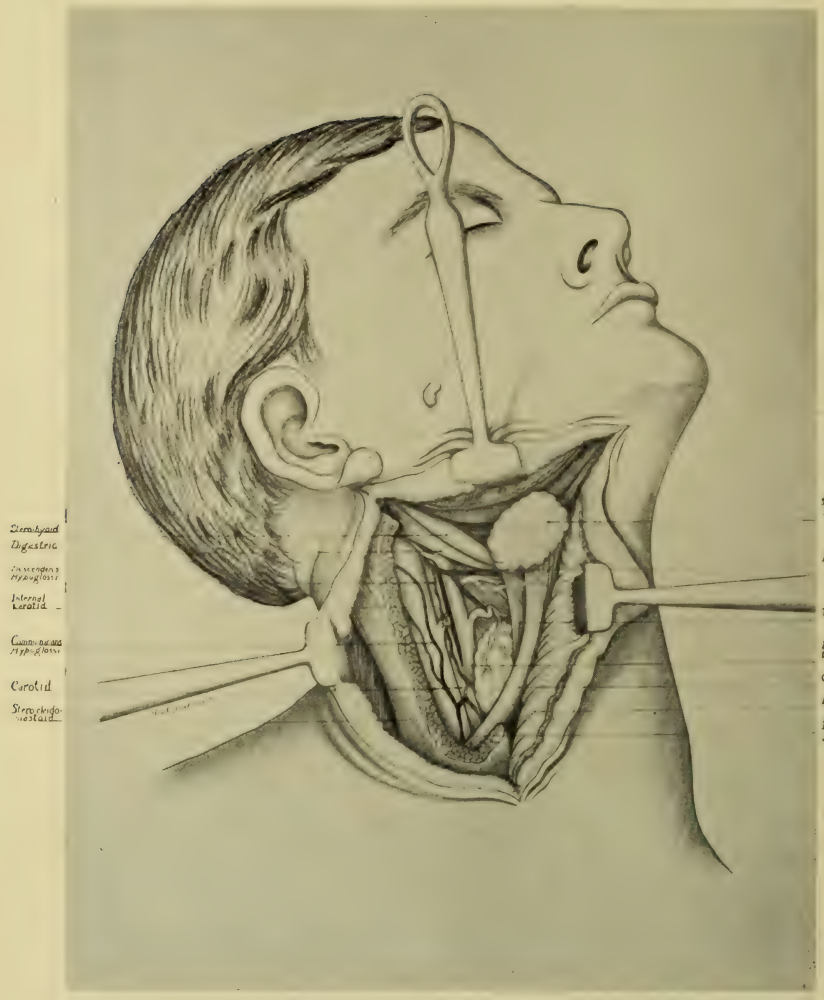


FIG. 6.—Plan of dissection (drawn from life) of a case in which no lymphatic metastases were palpated prior to the operation, but after opening the neck a single involved gland of small size was found. The dissection then was made to include a part of the sternomastoid to gain a free field for a wider dissection.

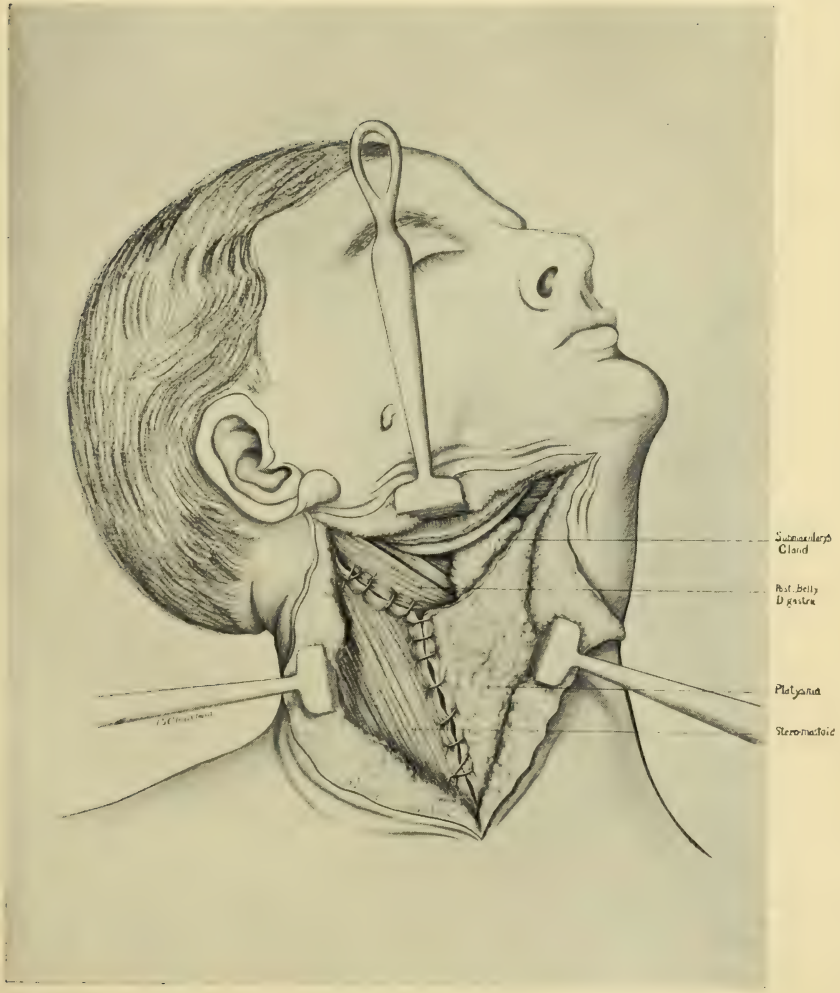


FIG. 7.—When in the simpler cases a local "bloc" excision is made and only a part of the sternomastoid is excised the deep defect may be well overcome by the remainder of the sternomastoid to the posterior belly of the digastric, the remnants of the platysma, and other tissue.

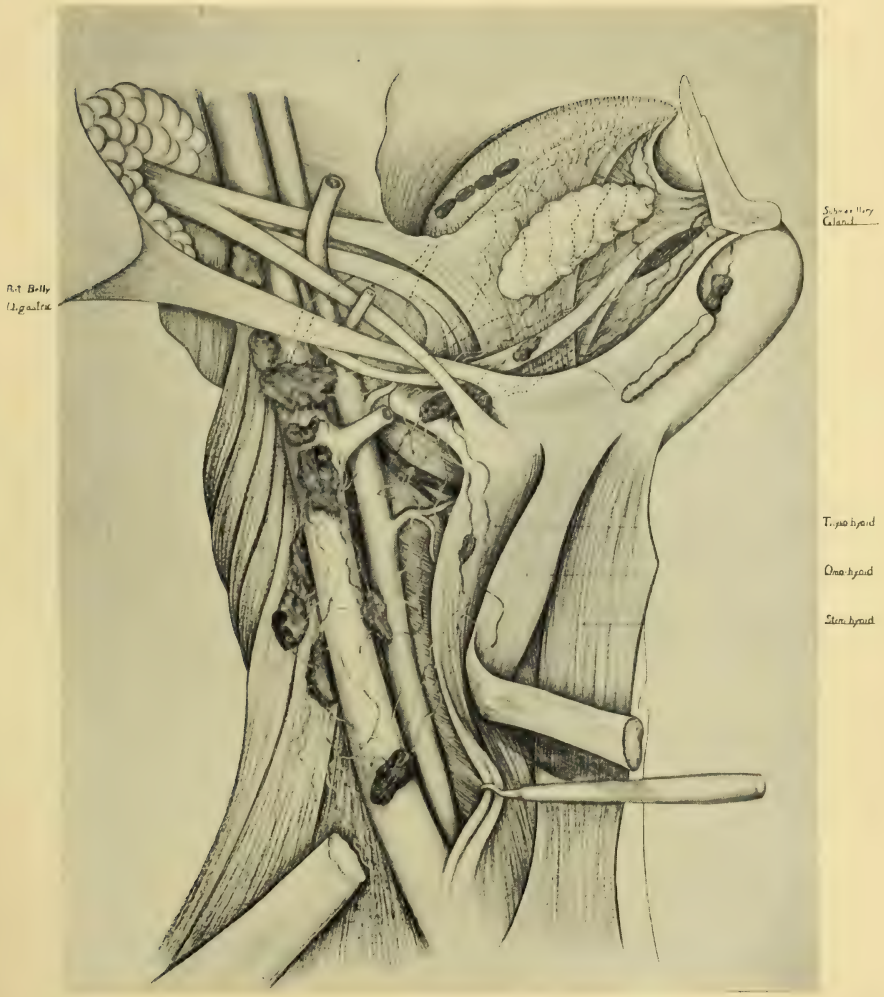


FIG. 8.—Showing the deep lymphatic drainage of the tongue, making it necessary to perform quite a different operation than in cancer of the lip. The first gland to become involved in a tongue cancer may be the deep one exposed by dividing and retracting the ends of the omohyoid. (From Poirier, Cuneo, and Delamare.)

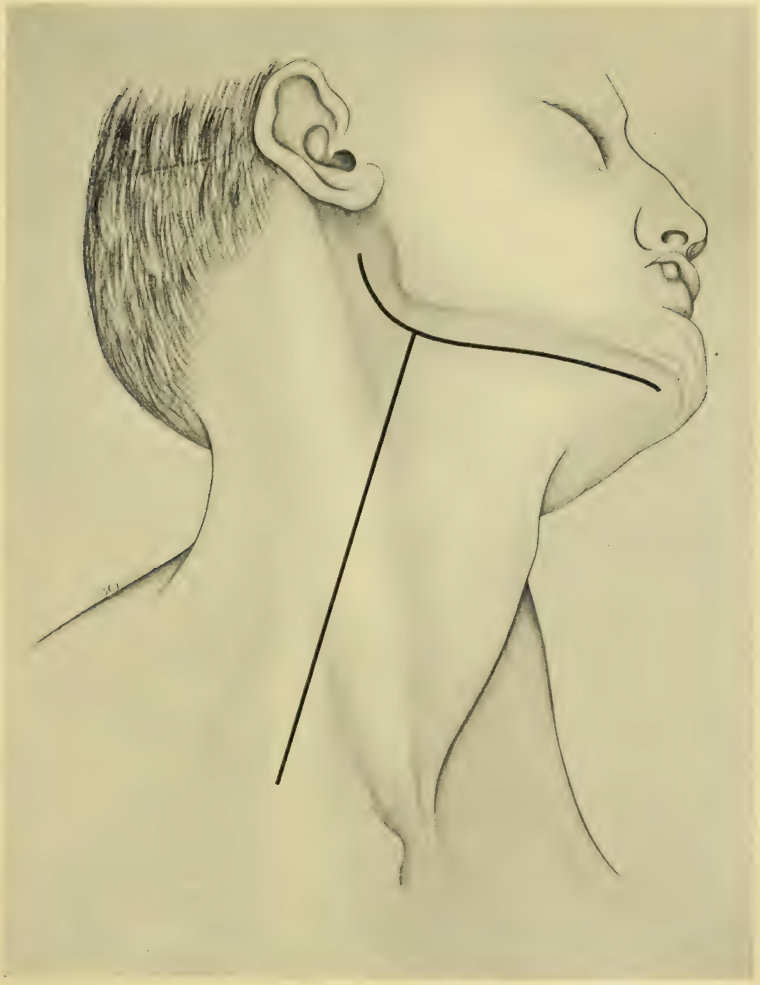


FIG. 9.—Case of unilateral cancer of the lip with metastasis in the cervical lymphatics. The incisions are made so that when the skin has been reflected in all directions the entire lymphatic gland bearing area will be exposed.

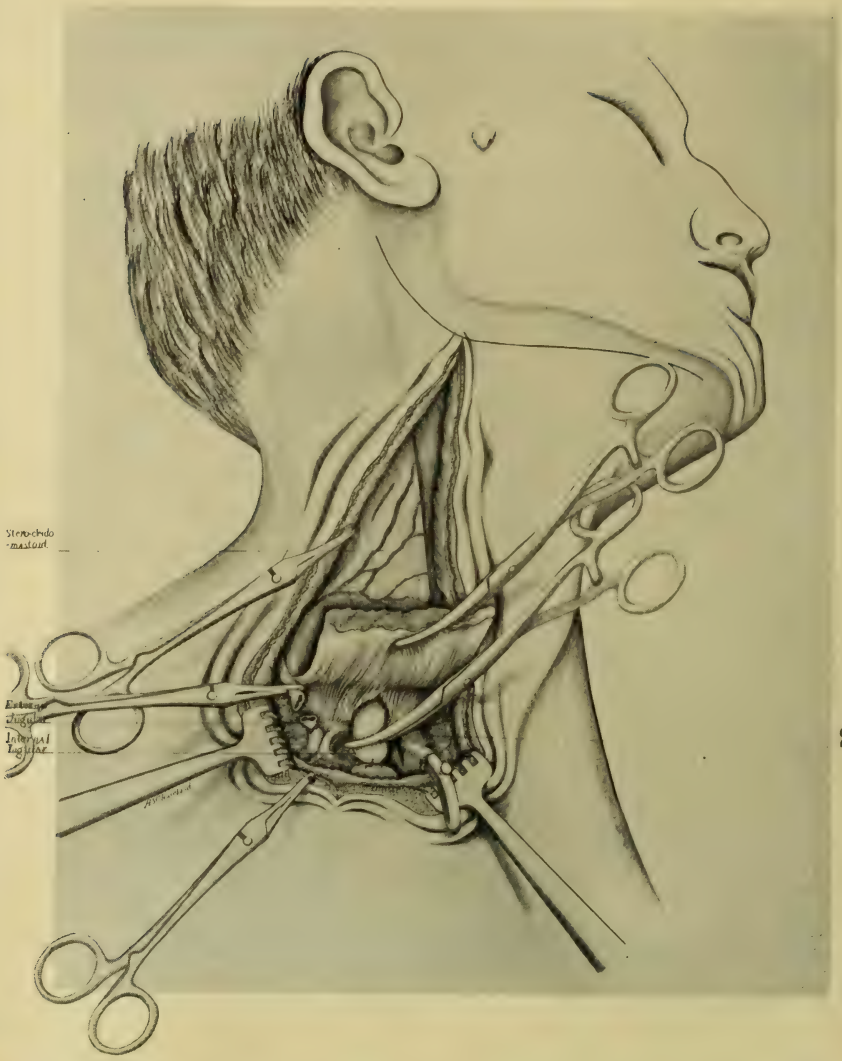


FIG. 10.—Second step. Division of the sternomastoid near the clavicle. Ligation of the internal jugular at two points preparatory to dividing it, after which the common carotid is closed by a clamp of special device.

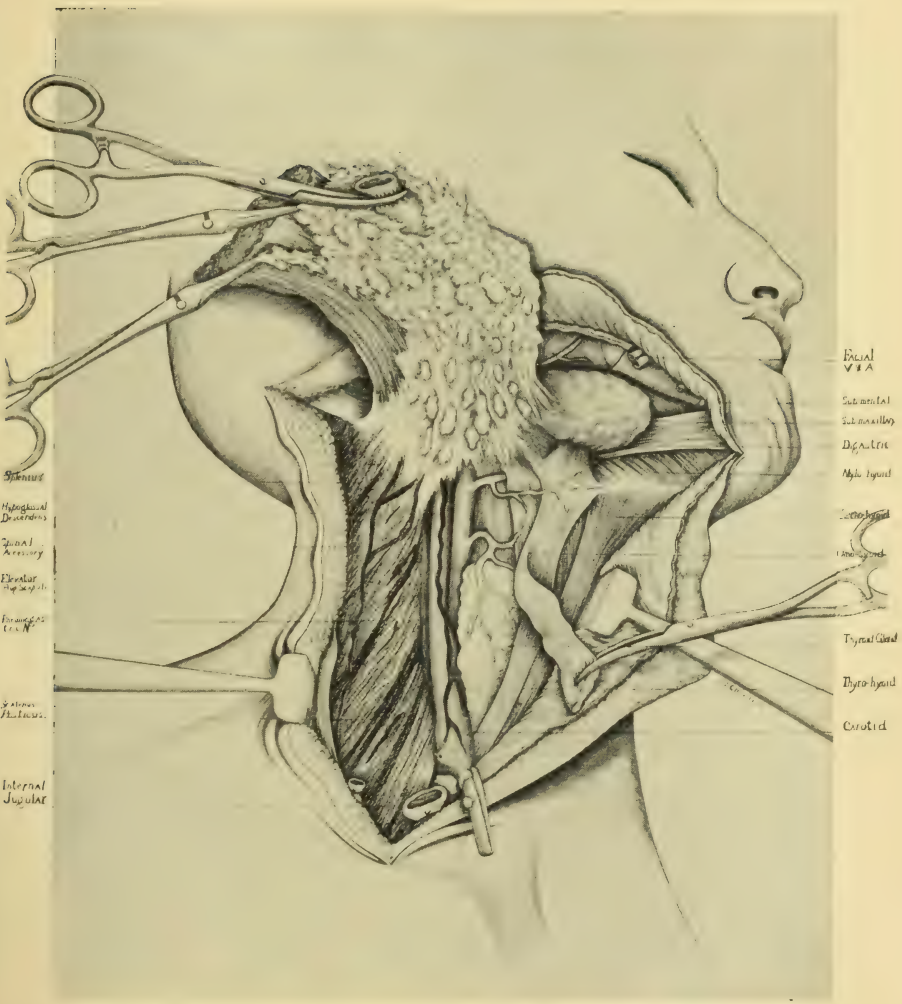


FIG. 11.—This figure represents the skin reflected, the vein muscle, fascia, fat, lymphatic vessels, and glands of the side of the neck separated up to the jaw.

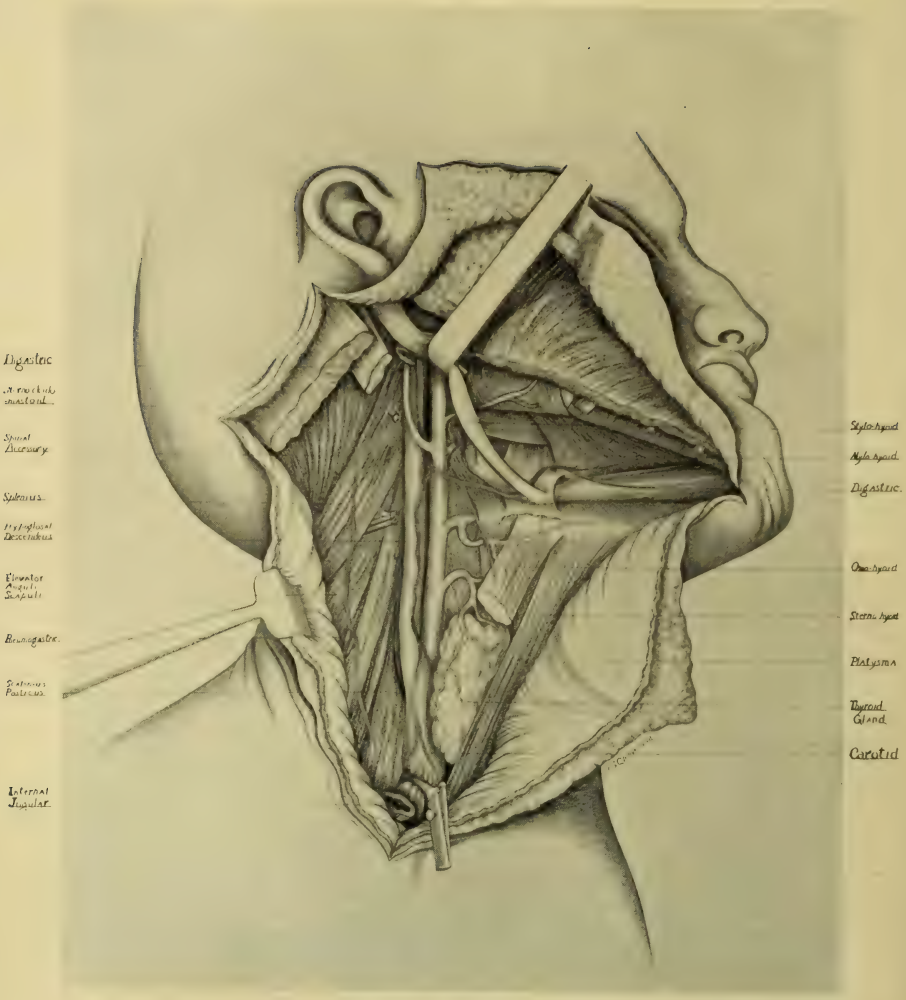


FIG. 12.—Completed "bloc" dissection. It will be noted that only the deep muscular plane and the artery and vagus remain. This extensive dissection is made only when there is actual involvement of the cervical lymphatics.

its lumen may be closed by a clamp, thereby ending the reverse as well as the direct stream of blood. The common may then be unclamped.

Shock and Collapse. In these extensive operations prevention rather than attempt at cure of shock and collapse is all important.

The principal shock producing factors are: the number and intensity of surgical contracts—as forcible retraction, vigorous and repeated sponging, blunt dissection, tearing, etc.; the loss of blood, mismanaged anæsthesia, and the duration of the operation.

The principal factors causing collapse: interference with the trunk and certain branches and terminals of the vagus, excessive hemorrhage, air emboli, and the anæsthetic accident.

To prevent these the operative field should be subjected to the very minimum trauma by providing ample operative space, employing sharp dissection, minimum retraction, and preserving the field free from blood, thus minimizing the trauma of sponging. The loss of blood may be reduced to a minimum by methods already suggested. For the purpose of paralyzing the nerve endings of the vagus in the heart, thereby wholly preventing collapse from direct or from reflex inhibition through the vagus or its branches and for the purpose of controlling secretion, a hypodermic injection of atropine may be given a half an hour before beginning the operation. If not contraindicated, morphine may be included. Its advantages consist in its favoring a quiet anæsthesia and its partially supplementing the general anæsthetic. By taking advantage of the distribution of the sensory nerves, the supply of which is rich in the superficial parts while scanty in the deeper planes of the neck, but little ether, in addition to the morphine, is required during the latter dissection. This is quite analogous to the ether-morphine anæsthesia in certain prolonged abdominal operations, in which the less painful part is done principally

under the morphine factor of the anæsthetic alone. The factor of hemorrhage may now be practically eliminated and with it that of air embolism.

In laryngectomy, if the superior laryngeal nerves are early exposed and divided, all cardiac and respiratory inhibitory reflexes and for the most part pain and coughing are prevented and the operation may proceed as quietly as the performance of herniotomy. In the dissections of the neck the desired standard of technique is attained when the field is maintained so clear that the minute tissues, such as the lymphatic vessels, are clearly and distinctly seen and when one would not expect to damage even the sympathetic nerves unintentionally.

In estimating the possible shock or collapse it is well to bear in mind that in the cancer period of life there is apt to be cardiovascular changes of supreme importance.

A high degree of atheroma, senile heart, or a chronic myocarditis are all important factors which should be met before the day of operation by such therapeutic measures as digitalis, nitroglycerin, etc., as may be indicated. Unless these factors are somewhat anticipated but little can be done in the midst of the operation toward their mitigation. When the wound is large one must not forget the importance of moist saline compresses to prevent the effects of exposure to the air.

The practical application of the foregoing data may be illustrated in the technique employed in a case of carcinoma of the mouth, involving the margin of the tongue, the floor of the mouth, the lower jaw, and with extensive involvement of the submaxillary lymph glands. The patient was sixty-four years of age, a pronounced alcoholic, with very marked sclerosis. Owing to the involvement in this instance one would be quite compelled to take the double risk of the neck dissection and the excision of the original focus at one operation. Assuming all preliminary preparation to have been made the patient was given an injection of one-fourth grain

of morphine and one one-hundredth grain of atropine half an hour before beginning the anæsthetic. After the completion of anæsthesia the pharynx was cocainized to prevent reflex inhibition from the manipulation incident to the tubage and packing of the pharynx; two rubber tubes, closely fitting the naris and having small perforations at their distal ends, were pushed down to the level of the epiglottis. The tongue was then drawn well forward, a large piece of gauze was packed firmly into the pharynx, completely filling it, the brunt of the packing being made at the sides of the tubes, preventing their compression; the patency of the tubes and easy respiration were then verified, a tube was then connected with an inhaler and the anæsthetizer took his place a foot or more from the field of operation, giving him the opportunity of continuing an even uninterrupted anæsthesia, allowing the surgeon full control of the operative field, preventing the entrance of any blood into the pulmonary tract and permitting the operator to place the patient in any position he chose.

The rubber suit had been placed and laced up during the administration of the anæsthetic and was sufficiently inflated to merely support the circulation of the extremities and the abdomen up to the costal arches. The patient was then placed in the inclined posture, head up, and the skin incision over the common carotid artery just above the clavicle was made. The artery was exposed by an intermuscular separation of the sternomastoid, and the division of the sheath of the vessel and temporary closure by means of the clamp was made.

The complete skin incisions were then made, the skin reflected back over the entire area of the fields. The sternomastoid, the internal and the external jugular veins and the fascia were divided at the base of the neck. The dissection was then carried from below upward into the deep plane of the neck behind the lymphatic glands, working first at the sides, then posteriorly carrying upward all the fascia, muscles, veins, fat, and connective tissue, never dissecting

individual glands, continuing until the floor of the mouth was reached, the lower jaw was then divided with a wire saw, at a safe distance on either side of the growth. The floor of the mouth and the border of the tongue were then similarly divided, completing the entire block dissection. All vessels were then tied, the floor of the mouth closed with catgut sutures and the stump of the tongue secured against oozing by buttonhole stitching with catgut. The clamp temporarily closing the carotid was then released.

During the operation an assistant experienced in the use and familiar with the purpose of the sphygmomanometer was in charge of the circulation. When the pressure fell below 120 mm. the pneumatic pressure was increased as needed. Fearing the inhalation of some unavoidable oozing from the floor of the mouth and the stump of the divided tongue, the rubber tubes and the pharyngeal gauze packing were allowed to remain as a guard, under the direction of the same assistant until their presence raised a protest from the recovering patient. In the meantime the rubber suit was continued so that the patient could be elevated on pillows, minimizing the probability of the inhalation of blood, until full consciousness was reached and the circulation had been established upon a safe physiological status. The suit was then decompressed and removed.

The patient remained free from the disease for three and one-half years, when he died of acute pneumonia.

Clinical. Since I have become especially interested in the problems relating to this field of surgery I have performed 121 operations on 105 patients. A study of the literature convinces me that one could obtain the safest conclusions from his own experience, as it is impossible to get a precise knowledge of the plan, purpose, and descriptions of other surgeons. I have, therefore, depended largely upon my own tables for the conclusions.

We now appreciate as we could not in the first of this series that incomplete operations do more harm than good.

Our principal errors on this point consisted in the removal of individual glands, in providing insufficient space for the dissection, in regarding hemorrhage too lightly, in handling carcinomatous tissue, in limiting the dissections only to tissues of known infection—in short, in not doing a complete comprehensive operation. The early and vigorous return growth clearly proved the fallacy of our technique. Experience, too, taught us what cases approximately should be considered inoperable. We have never seen benefit in excising a recurring malignant tumor which had transgressed lymphatic structures and freely invaded the deeper planes of the neck. If, on the other hand, the deep planes were free and the skin involved, there still remained hope of cure.

Our earlier cases gave such unfavorable results that we decided to give a fair trial of the plan here described, and should the end-results not show a marked improvement we would probably operate much less frequently on these cases. Happily the results have been most encouraging—showing approximately four times the former rate of cure. Among the fifty-one cases operated since 1900, twenty-eight are at present free from recurrence. Deducting the immediate deaths we have forty-six that have been taking the test of time—among the forty-six twelve have remained well three or more years. While the series is too small and the time elapsed too short for valuable deductions, we have, in following both series, gained the conviction that treatment of cancer of the head and neck has in the past four years yielded as good results as like treatment for cancer of the breast.

In the prosecution of the research problems in the laboratory and the clinical problems in the operating-room, I have to acknowledge the constant co-operation and assistance of my associate, Dr. W. E. Lower.

Our general conclusions are that since the head and neck present an exposed field, cancer here, unlike that of the stomach, the intestines, or even the breast, may be recognized at its very beginning; that every case is at some time curable

by complete excision, that the field of regional metastasis is exceptionally accessible; that cancer rarely penetrates beyond the extraordinary lymphatic collar of the neck, that the growth tends to remain here localized, and that by freely utilizing all the modern resources of surgery and by applying the same comprehensive block dissection as in the radical operation for breast cancer, the final outcome in surgical treatment of cancer of the head and neck should be not only as good but even better than that of almost any other portion of the body.

DISCUSSION.

Dr. Charles H. Mayo, of Rochester.—This is to me a most interesting region for surgical work. A large part of abdominal work is recreation as compared with the bulk of what might be called the heavy surgery of the neck, which Dr. Crile has so well described. Years ago, we used to abuse the cancer-paste man because he applied paste for removing regional cancer, and in many instances he used it successfully, and still we abused him for doing such work instead of using the knife like ourselves. Finally, physicians were aroused to the progress that was being made in surgery, with particular reference to cancer, and we were taught that cancer seldom destroys life in its original location, but that death was caused practically from secondary involvement nearly always, from involvement of the lymphatics, etc., so that in cancer of the breast, for instance, no one thinks any longer of removing only the breast itself, but the axillary glands and regional glands through which the lymph channels carry infection, and these must be taken with the breast or the operation is considered incomplete. When a patient comes to you, as Dr. Crile has said, with cancer of the lip, the involved regional glands must be removed with the lip at the time, and the patient should be informed that for him his life insurance lies in the removal of those glands. To have this subject presented to us by one who has devoted so much time to the surgery of the neck as Dr. Crile has done is certainly most interesting and edifying.

Dr. Crile touched upon the question of shock. This morning, in a discussion on foreign bodies in the œsophagus, the same

question came up in connection with the removal of a safety pin from the œsophagus. Dr. Crile pointed out that under anæsthesia we might produce the most intense shock with even a feather introduced into the pharynx, but the patient would not receive any shock if we should work through an incision in the œsophagus. At any rate, the shock would only be slight.

There is one point to which I desire to refer, and one which is under dispute at present. It has been claimed for a long time that the submaxillary gland has no lymphatics in it in the shape of glands, but has large lymph ducts, lymph channels, but more recently it has been claimed that there is one small gland in the majority of cases in the submaxillary, so that I feel like removing the submaxillary in all cases in which I am making a regional dissection to remove *en bloc* the lymphatic system.

As to the question of hemorrhage from the veins, which Dr. Crile described so thoroughly as having been controlled by clamping the carotid, and also in his work on the internal jugular, I have employed a method quite frequently, and in our work of dissecting the glands of the neck to prevent air embolism, I witnessed a death on the table eight years ago by a surgeon opening a vein and air embolism occurring. Then for a time, I put a temporary ligature on the vein, with bow-knot to be pulled out at the close of the operation. Later, a point which I got from Murphy was to expose the lower region early, roll up tightly a ball of gauze, and insert under the attachment of the sternocleidomastoid and omohyoid in the angle of the neck in the union between the clavicle and the sternum. This compressed the vein lumen, and during inspiration the vein would remain full. Since I have done that it has facilitated dissection materially, because it is sometimes convenient to see the distended vein where you are not afraid of the loss of blood but are of air.

Dr. Joseph Ransohoff, of Cincinnati.—I do not think this subject of the surgery of the neck should be permitted to go by without a full discussion, notwithstanding the lateness of the hour. We all concede the great interest and impetus that have been given to the surgery of the neck by the admirable work done by the essayist; yet there are a few questions which occur to me that I would like to have him answer if he can.

Many years ago I had a most gratifying result following an operation for cancer of the tongue. The man lived after an

old-fashioned Whitehead operation that was done on one side for the removal of a single gland in the submaxillary region. He lived six years without recurrence.

I would like to ask Dr. Crile how many patients he has had who lived longer than five years after thorough dissection of these glands, or after the more radical operations that he has performed?

Of course, we can all do a radical operation upon the breast. It is the right thing to do, and yet we cannot help but acknowledge the fact that good results were obtained by the older operations. For instance, there is the operation by Volkmann, in which he removed the entire breast and a few of the lymphatic glands, not doing as extensive an operation as is done to-day, yet he achieved admirable results.

Regarding the removal of the internal jugular vein, it is not a difficult operation. We must do it at times, because sometimes the tumor of the lymphatics encircles the vein to such an extent that the vein must be removed.

How about doing operations on both sides? Let us take epithelioma in the midline of the lip, seemingly a small insignificant affair, as we have frequently seen them. Are we going to do an extensive operation upon both sides, or are we going to do an extensive operation on one side? If on one side, on which side? It is very essential to know. We have quite an extensive lymphatic anastomosis from one side to the other. We see it in the neck and breast. I recall one case of malignant tumor in the breast of a young person. The tumor developed in one breast. It was removed by a thorough operation, and there was no recurrence on that side. The thing noticed was malignant disease in the axilla of the opposite side, and after that there was a secondary growth in the breast of the other side. The same lymphatic anastomosis goes from one side to the other. Therefore, notwithstanding the most extensive operation on one side, it still leaves a decided avenue for metastasis on the other side of the neck by this cross-cutting, and I would like to ask Dr. Crile whether, in order to be consistent, we must not in every case do an absolutely radical operation—do just as much on the one side as on the other?

Dr. Crile and I were discussing this subject a short time ago, and I told him I was about to operate on a man, forty years of

age, who had a fibrosarcoma of the alveolar border behind the second bicuspid, which involved the cheek, so that there was an ulcerative growth, extending perhaps three-quarters of an inch into the cheek away from the alveolar border. I asked him how he would deal with the case? Inasmuch as I could not feel a single enlarged lymphatic gland, I did not think I would be justified in going to the extremes of doing a radical operation.

There is one thing we must forget with regard to operations for malignant disease, namely, not to go to an extreme in the handling of malignant disease, because we can do irretrievable damage, owing to the fact that metastasis through the lymphatics occur so often shortly after operation, the metastasis not having been present for months before the operation, although a tumor was present. The operation is responsible largely for metastasis of the glands, and the operation is responsible because of the improper handling of the malignant growth itself. It ought to be a rule never to handle a malignant growth in an operation, but to cut all the way around it. Let the malignant growth alone. If you cut around the malignant tumor, circumcise it, as it were, the danger of infection is much less than if you go at the tumor first, and then remove the lymphatics.

A word or two more and I have finished. I am going to ask Dr. Crile when he closes the discussion, to tell us how many cases he has had to date of tumors of the upper jaw of a malignant character upon which he has operated, say as recently as two years ago, that are well?

Dr. J. Shelton Horsley, of Richmond.—In regard to the point made by Dr. Mayo, I have found on two occasions, when operating for malignant trouble, a lymphatic gland embedded in the submaxillary gland. There was no question about it, because they were practically surrounded. In one case entirely; in the other case a small portion of the lymphatic gland was showing. I have been attempting to follow the principle inculcated by a great many and brought prominently before the profession by Halsted and Willy Meyer, that cancer is just as infectious as many other things, and the mere fact that we cannot see the cancer cell makes no difference. We should be more careful in attempting to anticipate infection from cancer than from actual pus. The mere fact that we operate and find pus makes it more impressive. But cancer would be more dan-

gerous than pus for no other reason than because the cells are invisible.

I have followed a plan which I think is of some benefit that is frequently flushing the area that I am operating on with salt solution. In spite of care, we may infect the tissues to some extent and by flushing the wound with salt solution we are able to remove or impair the vitality of the cancer cells. Certainly, we can do no harm by this, and may do some good.

In regard to the removal of the internal jugular, it may not be a serious matter to do this on one side, but in many instances we have to operate on both sides, and I should say it would be decidedly risky to remove the internal jugular on both sides of the neck.

Dr. F. W. Parham, of New Orleans.—I would like to know a little more from Dr. Crile regarding the indications for this extensive procedure. I regret very much that the Doctor had to hurry through his paper, as I should like to have heard a little more about the details. I have done a good deal of operative work on the neck, and I am conscious in many cases of not having done the operation sufficiently thorough. In closing the discussion I would like to have Dr. Crile mark out the indications more distinctly, as they are not at present clear to my mind, in what stage of involement this very thorough operation is to be done; whether he intends that it shall be done in cases only with palpable lymphatic involvement below the jaw, or that it shall be in all cases such a radical operation as that described by him. Shall we carry it out in all cases of moderate involvement of the lip? Dr. Crile, as I understand, takes away the sternocleidomastoid, the internal jugular, and all the tissues down to the level of the carotid. I should like to know just what the indications are for doing this more thorough operation.

Dr. Edward H. Ochsner, of Chicago.—I would like to ask Dr. Crile what the effect has been on the mobility of the neck, after the removal of the sternocleidomastoid, the omohyoid, and the digastric muscles, and to what extent the movements of the neck have been impaired

Those of us who have known of Dr. Crile's most excellent and elaborate work in this matter have followed it with great interest. I knew when Dr. Crile began this work about six

years ago, and nothing has interested me more than to hear his paper at this time when he has reached rather definite conclusions.

In reference to the little instrument he uses for clamping the carotid artery, I can say that I have employed it quite frequently. He gave us a little clamp five or six years ago which we have found very useful. We have done the operation Dr. Crile recommends when excising epitheliomata of the lip, excising first the glands. The question has often been asked at our clinics, and it is one that is apt to occur to anyone, "What good does it do to remove the glands when it is impossible to remove the lymphatic channels between the carcinoma and the glands?" The answer is plain: The lymphatic glands act as sieves. The fact that the first gland which drains an area is involved does not necessarily mean that the lymphatic channel between the primary carcinoma and the gland is also involved; in fact, in early cases where the damming up has persisted too long, it is rarely if ever involved. The first, second, and third lymph node may be involved before this damming-up process takes place. These infected lymph nodes should be removed, and by doing this carefully and systematically I believe one can secure a larger percentage of permanent cures.

Dr. Charles M. Rosser, of Dallas.—With reference to epithelioma of the upper lip, a case recently came to my clinic that had been treated by the *x*-ray for some time, but in which the disease recurred. We excised the lump widely and there was no other involvement, so far as we could determine. The tumor had existed for a year and a half, it having been retarded, it was supposed, by the *x*-ray treatment As we all know, involvement of the lower lip occurs much oftener than the upper lip, but I should like to know whether Dr. Crile considers that the radical operation should apply to cancer of the upper as it does to the lower lip.

In the case recited the patient had previously suffered a fracture of the superior maxillary on that side and the consequent inflammatory reaction appeared to have imprisoned the lymphatics in scar tissue. For this reason simple excision was performed.

Dr. W. S. Goldsmith, of Atlanta.—I have tied the external carotid eight times, and the common carotid four times; and

we have in Atlanta a man who has operated more than forty times for the removal of the lower jaw, making a comparatively bloodless operation by tying those arteries. If Dr. Crile thinks there is no necessity for tying a single vessel, and can make the operation satisfactorily without it, I would like to ask him how, after applying these clamps to the vessels and removing them, as he must necessarily do, he controls the subsequent bleeding from the area that is dissected out or is exposed? I would like to hear from Dr. Nicolson on this subject.

Dr. William Perrin Nicolson, of Atlanta.—I have been very much interested in Dr. Crile's paper and in the discussion because it is along a line of work in which I have done a great deal. I admit that the operation as advocated by Dr. Crile is heroic for early cases of epithelioma of the lip. I think almost everyone knows, who has had experience, that we can cure most epithelioma of the lip by excision; but I have been interested in his method of controlling the hemorrhage from vessels by clamping, although I have not done so in my work. I have tied the external carotid something like forty times without any mortality; but, of course, that would not apply to the deeper dissections, such as Dr Crile has referred to and spoken of, particularly the vessels given off from the common carotid, the area which involves the clavicle and the large blood supply from the subclavian artery. I do not know how he controls that part. The clamp will control only the blood supply of the common carotid.

Ligation of the external carotid has been comparatively simple, and in many cases has been an absolutely harmless procedure. I have tried in many of my later cases to avoid the danger of formation of a thrombus by tying the vessel in the crotch. I have tied the external carotid immediately in the crotch and below the superior thyroid artery. I have found ligatures perfectly satisfactory at that point. If, after tying the external carotid, you should cut one of the branches, you may get a profuse hemorrhage from the upper end. I have done that twice in the operation of excision of the carotid, as advocated by Dawbarn, which I have done eight times; that is, after excision of the artery and tying off of these branches. I regard the ligation of the external carotid as harmless. I have done simple ligation of the common carotid six times. I have on two occasions tied the common carotid on one side and the exter-

nal carotid on the other, without any accident. You may get some hemorrhage even after ligation on account of the free anastomosis of the veins. I must admit I have had some fear in clamping vessels, thinking I might possibly do damage, and there would be more danger than from ligation of the external carotid which, in my hands, has been perfectly harmless in quite a large number of cases.

This subject is of great interest to me. The question has been asked in what class of cases he would do this operation. He has already mentioned, I think, the cases in which he would recommend it, namely, when he is satisfied that he has carcinoma to deal with. I shall try this method of operating some time.

I agree with Dr. Mayo that abdominal operations are in many instances recreation as compared with the work which we sometimes do in the neck; yet I think many surgeons have unnecessary fear of free and extensive dissections in the neck. I think the average surgeon has a perfect horror of the superior carotid triangle and its various surroundings, but I have found it is not quite so formidable as one thinks when he gets thoroughly acquainted with it.

I have a case now in which I am trying to decide as to an operation for cancer in which I propose to resort to excision of the external carotid, remove half of the tongue, and eight days afterward remove the external carotid to cut off the blood supply in that way; but I think I shall try to muster up nerve to resort to Dr. Crile's method of attacking the disease from below up.

I am glad to have had the pleasure and opportunity of hearing the paper.

Dr. James B. Bullitt, of Louisville.—There is one point which to me Dr. Crile did not make entirely clear; in the drawing he showed us the lymphatics of the neck, lying in two different planes, and after he came to describe the operation, he described it as though the entire removal of these glands was effected from the deep plane. I would like to have him explain that point more thoroughly.

Regarding the remarks made by Dr. Ochsner, who said the question is oftentimes asked, what good there was in removing the lymphatic glands, when the infected lymphatic channels were allowed to remain. It seems that such a question is natural, and his reply is that these channels are not infected. Well,

that is probably true. I take it that it is true, because he has said so, and he is well informed on the subject. But we must recognize the fact that there is a time when these channels are infected, or, at least, infective, when infectious material is passing down the channels from the primary location of the cancer to the lymphatic glands, and no matter how thorough the operation may be for the removal of the lymphatic glands, we must recognize the possibility of leaving behind infected or infectious lymphatic channels which have within them infectious material, which in turn could infect other structures. This is one of the sources which the surgeon is never able to cope with, and it will remain as one of the unknown factors which has to do with the recurrence of carcinoma in spite of the most radical operations.

Dr. Crile (closing).—Replying to Dr. Mayo's question, I remove the submaxillary glands in the operations in cases in which the cervical glands are already involved; in cases in which no macroscopic involvement has occurred and the glands are removed as a precautionary measure, the submaxillary salivary glands are not removed.

Referring to Dr. Ransohoff's inquiry, three of the cases operated for cancer of the tongue are living, at seven, three, and two years, since operation.

In one instance I excised both internal jugular veins, but both external jugulars were intact. The venous supply is so abundant that the collateral supply may be depended upon. I would not care to risk excision of both the internal and the external jugulars, though I dare say the collateral vessels of the superficial and the vertebral groups would even then be sufficient.

Dr. Parham has asked for a more definite statement as to the indication for such extensive operations. In the early stages of the primary growth, and in the absence of any evidence of metastasis only, the lymphatic glands and tissue that normally drain the involved tissue are excised.

In every instance of demonstrated involvement of the cervical glands the complete block excision is made.

With reference to the remarks of Dr. Edward Ochsner upon the effect of excising the sternomastoid muscles, I would add that in none of my patients has there been any notable loss of the usual movements of the head and neck.

Dr. Goldsmith asked how bleeding is subsequently controlled

The vessels are seen and tied at the time of dividing them; should any escape notice they will appear when the clamp is opened.

With regard to the ligation of the external carotid referred to by Dr. Nicolson, my preference for low closure of the common carotid is based on the ground of its being here more accessible, but more especially, because of the danger of dissecting through an area of lymphatics involved in metastasis to expose the external carotid.

In reply to the question of Dr. Bullitt, the skin is reflected and the neck opened below, and from the middle line. The division of tissue is only through sound structures away from the field of probable involvement.

WANDERING, PARASITIC, OR ABERRANT RETROPERITONEAL UTERINE FIBROMATA.

By I. S. Stone, M.D.,
Washington, D. C.

Some years since we wrote a thesis upon "Parasitic Tumors of the Uterus and Ovary." At that time we had no experience with the variety under discussion and therefore confined our remarks to intraperitoneal tumors. (Note.—Papers have since been prepared by Edebohls, Knott and Peterson upon the same subject, which have brought the literature of these peculiar neoplasms to a fairly complete compilation.) We have recently seen a few instances of what may be called "wandering retroperitoneal" tumors, because they have succeeded in getting away from the uterus and even the broad ligament, and have escaped into the space below the peritoneum and have an independent existence, remote from their former bed in the organ from which they sprung. Tumors in the space or territory which we are now studying may be either primary or secondary. Douglass has said about all that need be said of the first named variety. To this class belongs nearly every kind of tumor we may find elsewhere, including the fibromyomata, which we propose to describe. But in our description we shall confine ourselves to those tumors which have made their escape into remote retroperitoneal regions by way of the broad ligament, the folds of which must have been separated by the tumor, with the *vis a tergo* of continued uterine contraction. Besides this

contraction their exit from the broad ligament is further aided by the development of other fibroids which in turn press upon and force the preceding tumor into independent existence. Such tumors have but little apparent nutrition. The vessels are very small and furnish very little direct blood current. The peritoneal capsules which surround the intraperitoneal wandering tumor can only cover the anterior surface of the retroperitoneal variety. These tumors are not only behind the peritoneum, however, but develop much like renal cystic tumors, and may open the mesentery, which may be seen spread out upon the anterior surface of the growth with the most threatening aspect to him who essays the removal of one of them.

On the posterior surface they are usually separated from the pelvic or abdominal muscles and fascia by fairly abundant connective tissue which if free from previous infection permits a comparatively easy dissection. Operations are now becoming frequent and we no longer hesitate to attack disease of any kind which has involved the retroperitoneal space, and we have learned at the operating table rather than at the postmortem table how we may dare to interfere with the vessels, nerves, and lymphatics of this region. It is said by Douglass, and it is the belief of nearly everyone, that tumors of this region seriously interfere with nutrition, because they displace or press upon the lymphatics. In our two cases which we herewith present, the first one did show decided constitutional symptoms. But not so with the second case, for she was in excellent condition when we attempted to operate.

REPORT OF TWO CASES OF RETROPERITONEAL, WANDERING OR ABERRANT TUMORS.

Miss S., white, aged fifty years, had been in poor health for five years prior to her admission to Columbia Hospital on May 14, 1905. She had an enlarged and pendulous abdomen and looked like one pregnant at the end of gestation.

Her appearance suggested ovarion tumor rather than myomatous degeneration of the uterus. Her face was thin and shrunken and her whole body was suggestive of poor nutrition and of general poor health. Her weight was reduced considerably, notwithstanding the presence of the large tumor. Her normal waist measure was enormously increased, being at this time forty inches. The patient had continued to drag herself along and had only consented to come to the hospital after making every preparation for the operation. Although this patient had such a large growth we were impressed with the apparent freedom from pain and other symptoms which this lady experienced. She had no special bladder symptoms, although her bladder was raised far above its normal position. She had no great disability due to constipation or obstipation, nor had she much trouble with her stomach, which was subjected to severe pressure from below. In fact, all of the viscera were displaced, and we fail to see how she managed to take the least exercise, owing to the limited amount of room for chest or abdominal expansion. The intestines were found mainly on the left side and in front of the tumor, which was evidently retroperitoneal in location. The tumor was nodular and hard throughout its anterior aspect, and extended from the liver to the perineum. It crowded the vagina so far to the left as to make an examination almost impossible. We could not reach the cervix, nor could we locate the uterus, as it occupied the centre of a mass of fibroids in the vicinity of the umbilicus. As her urine was nearly normal and her heart in fairly good condition we determined to operate, and, if possible, to remove the growth.

Operation, May 3d. When the abdomen was opened the diagnosis was easily confirmed, and we proceeded to attack the tumor by making an incision posterior and to the right of the uterus, which opened the retroperitoneal space and enabled us to shell out the larger part of the growth without causing much hemorrhage. When the large tumors came

away we still had to contend with the remaining or pelvic portion. This was so firmly planted within the pelvis as to almost baffle our attempts at extraction. We had, however, located the ureter and vessels and had no anxiety about the immediate result of the operation. After the tumors were removed we were enabled to see the same exposure of the upper retroperitoneal space, as is ordinarily seen after the extirpation of a large renal tumor. But in this case we had in addition the complete exposure of the pelvic space with its vessels and both ureters. The uterus and adnexa were, of course, sacrificed, and the bladder was almost completely denuded of peritoneum and its usual connective-tissue attachments. The large abdominal vessels were beautifully exposed, and it is a matter of surprise that so much traumatism caused so little shock and that the peritoneum was finally restored to something like its normal position, and that no serious injury occurred to mesenteric or other vessels. The patient made a slow but uneventful recovery, left the hospital in five weeks, and is in fairly good condition at this time, the only embarrassing result being the pendulous abdominal wall. An examination of the tumor by our pathologist shows the absence of all traces of malignancy and that it is only a fibroma, a portion of which had undergone cystic degeneration. Neither retroperitoneal tumor had apparent connection with the uterus in any manner save through its capsule, and we could discover no important vessels supplying either the pelvic or the high abdominal portion. The tumors connected with the uterus, being intraperitoneal, were supplied by the uterine arteries.

Mrs. M., a nullipara, aged thirty-five years, had known of the presence of a tumor for the past two years, but stated that its growth had been rapid for a few months past, which fact, together with the soft character of the tumor, made us fear pregnancy as a complication. She had not been ill nor had she experienced great pain or any great inconvenience from the presence of the growth, but had consented to have

an examination made and operation, if found necessary. Our friend, Dr. Moran, agreed with me in the diagnosis, and advised operation, and we gave a rather hopeful prognosis owing to the excellent condition of the patient. The patient had irregular menstruation, had never had hemorrhages, and we all agreed in the diagnosis of a retroperitoneal fibroid. In this case the tumor was large enough to reach from the under surface, or just below the liver, and the ribs on the right side to the perineum below. Its most prominent portion, consisting of the uterus and annexed intraperitoneal tumors, was soft to the touch, and we were inclined to think the woman pregnant even with the history of more or less regular menstruation. The abdomen of this patient was about the size of one pregnant at the eighth month, and the distention was not so great as in the former case. The tumor was fixed within the pelvis much like the one previously described, and the rectum and vagina were pushed far to the left side. The cervix could be reached with great difficulty and only by making strong counterpressure upon the tumor near the supposed location of the uterus. It was possible to locate the left but not the right uterine artery, a matter which will be mentioned later.

Operation, June 3, 1905. Providence Hospital. Upon opening the abdomen we found the most prominent part of the tumor, or that attached to the uterus, was largely of soft myomatous character, which had imparted to the hand the sensation of pregnancy. The peritoneum was opened up on the right side and the mesentery and intestines pushed over to the left. The difficulties and embarrassments of the situation now presented themselves and could not have been foretold. The tumor was not only behind the peritoneum, but was made up of many tumors, and the arrangement was such as to absolutely prevent all recognition of anatomical landmarks. (NOTE.—Dr. De Launy, in describing a case of interest, were he removed a retroperitoneal tumor (*Paris Cong. de Chirurg.*, 1901, 14, p. 641, says of such cases: "A

condition of success is to forget the anatomy.") The tumors were attached here and there with the constant desire to reach the important vessels and to avoid hemorrhage. The tumors came away for the most part without great trouble until we had opened up a large space having the pelvic brim as a centre We had exposed and followed the right ureter through this space until it reached the bladder, which was done easily because the tumor which still remained in the pelvis had developed below this point and had elevated the ureter along with the uterus. The number of tumors making up the large growth was about thirty. The tumors were rather loosely held together by connective tissue, and with comparatively few vessels which gave us trouble. But there now remained the largest growth under the liver, and one or more within the pelvis, the former one being easily removed. As previously mentioned, we were unable to locate the uterine artery from the vaginal side of this tumor, and we now searched in vain for the vessels in order not to expose them to unnecessary injury. This we were utterly unable to do, and were obliged to attach the tumor and attempt its extraction without having it in our power to control the iliac or any artery below that point. Our efforts at the delivery of this pelvic tumor were unfortunately ineffectual, for in our attempt to release the mass from its bed we lacerated the vessels we were unable to locate, and the hemorrhage could not be controlled until the patient was beyond our help. We absolutely failed to remove this pelvic tumor, and not being allowed an autopsy we can only say that it was so firmly impacted as to resist all ordinary efforts at extraction even after as much dissection and separation of its attachments as was possible under the circumstances. It is possible that by making a search for the vessels and by securing the right iliac artery we might have succeeded, but the best efforts of my assistant, an expert and highly competent anatomist, were unavailing after the hemorrhage began.

The specimen consisted of many fibroids of various sizes

and shapes, aggregating fifteen pounds in weight. All of them which were free from the uterus and below the peritoneum were of the hard fibrous variety. There was absolutely no suspicion of sarcoma or lipoma or other neoplasm seen or reported by the pathologist who examined them.

DESCRIPTION OF THE TUMORS.

The tumor in Case one was made of three principal portions. The central portion, or that near the uterus, was larger than the others, and was undergoing cystic degeneration. About three pints of serum escaped when the cysts were opened. The uterus and annexed tumors were immediately over this section of the growth, but were entirely free from it. The enucleation of this tumor was comparatively easy, and we had no difficulty in locating and protecting the ureters from injury. The next tumor above this was immediately over the right kidney and close upon the liver. Its enucleation involved exposure of the large vessels and other structures, much like we see in any other retroperitoneal tumor. Not a single vessel was ligated and we were unable to discover its source of nutrition. Its anterior surface only was in contact with the peritoneum, while on every side it was surrounded by rather loose connective tissues which permitted its removal without accident. Its interior was similar to other fibroids in other localities and it had not the least evidence of cystic or malignant degenerative changes. The microscopic examination of this tumor was made by Dr. James Carroll, U. S. A., and pronounced a fibroma.

In the second case the tumor was arranged upon the same general plan as to its development and position under the peritoneum. The central portion was, however, made up of many small tumors which had effectually disposed of the larger growths exactly as in the previous case. The whole mass was not so large as in case one, and the complications which embarrassed us could not have been foretold. Immedi-

ately after opening the retroperitoneal space we encountered a number of small fibroids corresponding with the location of the broad ligament. These tumors had evidently developed in the uterus and had continued to crop out and to pass upon those below them until the more distant ones had no connection or blood supply from the uterus. After we had removed a number of these smaller tumors we had exposed the right ureter, but not the iliac vessels. On account of hemorrhage we were compelled to desist from our premeditated attack and were obliged to attempt the removal of any portion offering a safe enucleation. Our efforts to remove the tights fitting pelvic portion were absolutely a failure owing to it-firm attachments, and to the fact that it was round and appeared to fill the pelvis so perfectly as to prevent its safe enucleation. In our efforts to dislodge it we injured a large vessel causing a severe hemorrhage which we were unable to check. The tumor nearest the liver in this case as in the first was easily separated from its bed and had no apparent arterial supply. It was fairly well covered on its anterior and lower surface by peritoneum, which appeared to separate it entirely from the tumors below.

DISCUSSION.

Dr. Charles P. Noble, of Philadelphia.—I would like to ask Dr. Stone one question, namely, whether these tumors were all connected one with the other, or whether they were separated one from the other, with a space in between?

Dr. Stone.—The only connection was from connective tissue and the capsule. I have made a pencil drawing of the last case in which there was only a small amount of connective tissue and quite a space between. The tumors were distinctly separated in this case. In the other, the last case, the larger fibroid acted as a wedge, pushing one above and the other below, as it grew, forcing it down in the pelvis on one side and higher up on the other.

Dr. Noble (resuming).—It seems to me these two cases are exaggerated instances of what is very common, that is, the ordi-

nary broad ligament development of fibroid tumor. The tumors grew from the uterus, projected into the broad ligament, or projected in Douglas' pouch, then as they grew the peritoneum was raised up until they reached the liver. I have never seen such immense retroperitoneal tumors as in this case, but it seems to me the nature of the case is quite analogous to the retroperitoneal broad ligament cysts that are not at all uncommon which we have seen developed fully, as behind the peritoneum as in these two cases. We are all familiar with the fact that fibroid tumors can become detached from their original site and wander in the peritoneal cavity and can secure a new blood supply by peritonitis, adhesions, and the formation of vessels. But it seems to me in these two cases that was not the process. They simpl grew directly, they did not wander; they filled the retroperitoneal space because they were so large.

With reference to the second case, which ended fatally, it is much easier to offer suggestions than it is to deal with the situation at first hand. However, a number of times I have been placed pretty much in the predicament Dr. Stone was in when I have had an ugly hemorrhage deep in the pelvis, which could not be reached, and in two instances at least I was able, by having an assistant make firm pressure on the aorta, to cut off the blood supply from the pelvis and get rid of the tumor sufficiently to control the blood supply locally. I think it is a useful manœuvre in such cases. It seems to me, also, that splitting of the tumor would have facilitated its enucleation, one portion being removed at a time.

Dr. Henry T. Byford, of Chicago.—I think it is quite easy to realize how these tumors may become separated. I have seen tumors much larger than a nine months' pregnant uterus which have come away without a trace of pedicle. I think as they develop under the broad ligament in the connective tissue they get their blood supply there. I have always thought the separation occurred in this way; they start on the surface of the uterus with hardly any uterine fibres over them, and as they develop in the broad ligament the little tissue over them, instead of becoming more vascular, becomes stretched and atrophic and as the tumor rises out of the pelvis and draws upon the uterus there are not enough fibres around it to form a pedicle. If one is formed it is so slight as to be destroyed by traction.

Dr. Guy Leroy Hunner, of Baltimore.—It seems to me that Dr. Noble's last remark ought to be amplified in connection with these tumors. He said that, at times, we find help in their removal by splitting the tumor. This is especially true in those cases in which the tumor or tumors just fill the pelvis and mould of this portion of the abdominal cavity. In such cases, if we cut through the peritoneum covering the anterior face of the tumor, and then the usual method try to get a line of cleavage around the two sides of the tumor, we often strike that line of cleavage a little too far away from the tumor, a little too near the large vessels that supply the surface of the tumor. Whereas, if we would continue that cutting through the peritoneum and cut down into the substance of the tumor there is no danger of hemorrhage in so doing, and the tumor being under the pressure that it is, and being of the elastic quality that it is, its two halves naturally begin to push upward as we cut down into them, and by the help of Jacobson's forceps we can lift these two halves nearer and nearer to the field of operation until we get them entirely cut through, when they are easily rolled out of their capsule. In this manner there is very little danger of getting the wrong line of cleavage. There is a certain layer of the loose connective tissue which, when struck, will give practically all the hemorrhage. I think Dr. Stone's last case might have been handled in that way. He tried to do what we always like to do, namely, we get control of the vessels first, whereas if he had simply left the vessels out of account, left the ureters out of account, and split down through the centre of this portion probably he would have turned each half out without any important structure.

Dr. Robert S. Hill, of Montgomery.—I should think cases such as reported by Dr. Stone are very, very rare. As a rule, uterine fibroids have their origin in the posterior wall of the uterus. Rare, indeed, do they grow from the space between the folds of the broad ligament. To grow from the posterior surface of the uterus, retroperitoneal, they must develop in the very small area between the roof of the vagina and the floor of Douglas' cul-de-sac. I should therefore certainly say that this is a very unusual location of fibroids. Still more unusual must it be for them located here to attain the size of those reported by the Doctor. Fibroids derive their blood supply from their

capsules and as a rule are not very vascular, consequently are of slow growth. In the cases reported we have them crowding one another completely from their bed of uterine tissue and into the surrounding loose connective tissue—with not so much as a pedicle remaining to hold them to the parent organ. Now, this must necessarily have reduced their naturally poor blood supply, and yet we are told they attained considerable size. Indeed, it would seem that cases such as these should be so rare as to constitute almost a surgical curiosity.

In undertaking the removal of large tumors I have frequently found it necessary to abandon the rule of first controlling the vascular supply by clamping the ovarian vessels. It seems to me if the Doctor had entered at the attachment of the round ligaments to the uterus, the uterus being well to the front and its cervix lifted above the pubes, as I understood him to say, I repeat if he had commenced his enucleation at the attachment of these ligaments to the organ and followed the loose connective tissue downward and backward, keeping close to the uterus, he could have secured the uterine vessels and thereby probably prevented the profuse hemorrhage which he encountered. The cases reported illustrate at least three practical points.

First. The absolute impossibility of adhering to any fast or fixed rule in the removal of large tumors. There is no rule in surgery or medicine that has become a law as fixed and unchangeable as the laws of the Medes and Persians. We must direct our efforts to the indications of the individual case.

Second. Whatever may be the differences in our attitude toward the general proposition of interferring with uterine fibroids we must agree that retroperitoneal fibroids should be removed as soon as discovered. Small growths in this position can be removed with little or no difficulty and practically no risk. If allowed to remain they may cause serious complications, particularly if pregnancy takes place, or if they grow, as in the cases reported by Dr. Stone, their removal becomes a serious proposition.

Third. The very patients in whom the catheterization of the ureters would give great assistance we cannot accomplish it. In the cases under discussion, the bladder was so displaced that the outlets of the ureters could not have been found; but even if they could have been found the irregularities in the

course of the ducts would have made their catheterization an impossibility. So I say again, in the very cases where the catheterization of the ureters would be of great assistance to us we cannot pass an instrument in the ducts.

Dr. Robert T. Morris, of New York.—May I speak of an instructive death which I had recently? Ten days ago I lost a patient upon whom I operated for the removal of a large retroperitoneal myoma, and after splitting the tumor and turning it out without much difficulty, although part of it reached above the umbilicus, the patient died that night. At the time of removing the pelvic retroperitoneal part of the tumor, the patient went into collapse. We gave an injection of salt solution beneath the breast. There was no oozing of consequence. I put in a drain, lightly packing, and got the patient back to bed. We applied hot bottles to the feet and gave intravenous infusion. The patient began to make a recovery, and in the course of thirty minutes or more was conversing with the nurse, and apparently starting out well toward recovery; but she died three hours later from hemorrhage. The reason why she died from hemorrhage was because a large number of small vessels which opened did not bleed at the moment when I put her back to bed. The reason why she did not bleed was because she was in a condition of collapse. These vessels opened later on the return of good heart power, and then she began to bleed like a sponge. Later intravenous infusion was given by one of my assistants; I was not present at this time, but the woman died. Why did this patient have collapse? For the same reason that a patient has collapse when we remove a large amount of ascitic fluid from the abdomen—from dilatation of the large venous sinuses. That is why my patient unexpectedly had collapse upon the table. I removed a large tumor and immediately the large abdominal sinuses were filled with blood, and the patient was bleeding into her own veins as after an operation for removing a large amount of ascitic fluid. How could I have prevented this fatality? I believe by preparing the patient with ergot in advance of the operation, as it gives us a high tension. While I cannot give you an opinion in this regard based on experience, in thinking of this death, I have asked myself the question how I could have prevented this patient from going into collapse on the table, and I have come to the

conclusion that I might have done it by giving her ergot fifteen minutes or half an hour before the operation. How could we have anticipated oozing from the many small vessels? I believe when the patient was put back to bed, if we had taken advantage of using a puckering string passed up through the peritoneum at any available point in such a way that we could draw the torn tissues together in a hard knot we might have prevented death. In the necessity for getting the patient back to bed I did not stop to do that.

Is it necessary to use so much precaution at the expense of the patient going into collapse for the sake of avoiding involvement of the ureter? We know that a great many ureters have been tied. Many of us have tied the ureters and patients have never found it out, because experiments have shown that if a ureter is tied, ordinarily the kidney undergoes absorption, as soon as the ureter and pelvis begin to fill with urine, pressure absorption occurs, and experiments have shown that the kidney on that side disappears, as a kidney becoming a fibrocystic mass without function. Those points are the ones I wish to make.

Dr. Joseph Ransohoff, of Cincinnati.—I would like to say one or two words in connection with this paper. I should not like the statement to go unchallenged, judging from the remarks of the previous speaker, that tying of the ureter is a rather harmless thing. That has not been my experience. I have seen ureters that have been tied in pelvic operations and the patients have found it out without doubt. In every case you will find some trouble with the kidney. It is not absorbed. I do not not know how a kidney would be absorbed from tying of the ureter. It is not absorbed, however, and gives rise to difficulty, so much so that there is either a floating kidney or distention, and very often incision of the kidney will not relieve the condition. I have had one or two cases in which kidneys had to be removed because of the ureters having been tied. I simply wish to say that the tying of the ureter in a pelvic operation is a thing that should not be passed off without the knowledge of the patient or of the physician.

Dr. Charles L. Bonifield, of Cincinnati.—I had a case recently, similar to the one reported by Dr. Morris, and I can testify to the shock-producing influences of sudden removal

of the tumor. In this case the tumor was as large as the second one reported by Dr. Stone, but it was removed without very great difficulty, with slight injury to the bowel. The patient, however, experienced profound shock, so that we were absolutely unable to bring her around by any of the well-known stimulants, and she died in about thirty minutes after she was put to bed. There was no more loss of blood than from the average abdominal operation. She died from shock.

Two years ago I reported to the Cincinnati Obstetrical Society a case of this character in which a woman became pregnant, and when she came to see me she was about five months advanced in pregnancy, having a large retroperitoneal fibroid. I had to take the word of her family physician with regard to her being pregnant, because I could not feel the uterus at all. It was pulled up so high behind the pubic arch that it was impossible to feel the cervix. In this case I was fortunately able to remove the uterus, the appendages, and the tumor and save the patient's life.

One of the important points in these cases to remember is, that where we have a greal deal of oozing we should be careful about stimulating too much. There is no doubt but that shock is a conservative process, and we should not try to get patients over shock too quickly. They should be watched and not allowed to go in the wrong direction. It seems to me, we are doing best for the patient when we allow nature to take her own time in bringing our patients out of this condition.

Dr. R. E. Fort, of Nashville.—I wish to put on record a rather unique case of a woman, sixty-five years old, who had never noticed the presence of a tumor until eighteen months ago. A year ago the tumor began to grow, and at the time of its removal it was as large as a head. On opening the abdomen I found that the tumor sprang from the retroperitoneal portion of the uterus. It was wholly detached from the uterus, with a thin pedicle the thickness of a double fold of peritoneum. This pedicle was two inches long. In removing the tumor from the pelvis, before I could get my ligature to tie it off, the pedicle was so friable that it began to tear. But it was tied off. The woman went into collapse, and she was with great difficulty reacted. I succeeded in enucleating the tumor and closing the abdomen in about eighteen minutes.

This tumor was a myxofibroma, and the particular feature about the case is, why a tumor of that size should develop in a woman, sixty-five years old, with no attachment to the uterus except the peritoneal attachment. The pedicle of the tumor was all peritoneal, and two or three inches long. I thought this case was sufficiently interesting to report.

Let me report briefly another case, as I think it is appropriate in view of some of the things that have been said. The patient, a woman, had a retroperitoneal fibroid which sprang from the lower portion of the fundus of the uterus, pushing back the broad ligament. The small tumor was about the size of a turkey's egg. The broad ligament was split from its uterine side and laid back, and the tumor enucleated. I found the lower portion of the tumor surrounded by the left ureter, and the anterior portion of the tumor with the uterine artery quite a third around the tumor.

I have reported this case to show that I feel we should not follow the advice of some of the gentlemen who have spoken invariably, that there are times when we should and ought to remember our anatomy.

Dr. Daniel H. Craig, of Boston.—There are two things in connection with this discussion of which I want to speak, although I have not had any personal experience worth recounting. One of them is the criticism that has been made as to the manner in which Dr. Stone did not remove the pelvic portion of the second tumor. It seems to me the only man who is at liberty to criticise the way another man does an operation is the one who actually sees the operation. It is quite conceivable that a tumor may so fill the pelvic cavity, and we have all had experiences of that kind, that it is utterly impossible to begin at any particular place around the tumor with a view to removing or enucleating it. You must take what presents and do the best you can with it. It is quite possible Dr. Stone's case was such an instance as that.

The second point which I want to make is with reference to the case reported by Dr. Morris, his patient dying from hemorrhage three or four hours after operation. If you will permit me, I will say that it reminds me of a report I was reading in an old English book a number of years ago of a case, that was during the time of the great prevalence of venesection.

The report detailed the case of a very prominent individua who was taken sick; the family physician was called to see him and bled him, but he did not seem to do the patient any particular good. He called a neighboring consultant, and after due deliberation they bled him; his condition being even worse they sent for another consultant. After consideration they decided to bleed the patient again and they did so. The authority who published this account of the case was a London notable, and in reporting it he expressed himself as being greatly disappointed to find that after the last bleeding by the three consultants, and before he could arrive, the patient had died apparently exhausted. He thought it probable that if the patient had lived until he had arrived and he had bled him once more he would have gotten well. I should say, something of that sort happened in Dr. Morris' case. The patient was taken off the table in a condition of collapse with the vessels not bleeding. Intravenous salt solution was given under the breast. The house surgeon gave intravenous infusion later, and still another gave intravenous infusion, and in this way in my judgment they propped up the blood pressure of the patient much more rapidly than the condition of the bloodvessels was able to take care of it and I think that is the reason why that patient died of oozing hemorrhage.

Dr. Stone (closing).—I have very little to say in closing this discussion. I had operated for a long time without encountering any such cases, and then suddenly encountered two striking instances. In looking over the literature I was rather surprised to find absolutely no collection or report of such cases, and I thought the presentation of this subject might set the other members to thinking about it. I have no doubt a great many men of experience have had at least one or two of these cases, and did not want to report them bcacause they were so few in number. That is a mistake. These retroperitoneal tumors are difficult cases to handle. They cause a great deal of trouble, and very often a high death rate. It seems to me impossible to get the death rate reduced to 1 or 2 per cent. as in intraperitoneal hysterectomy. Ordinary hysterectomies are comparatively easy, and the death rate is not high. Retroperitoneal tumors need different surgery, and in speaking with reference to the anatomy I am a little surprised that I did not make

myself clear. I understand, for instance, that in a case of intraperitoneal growth we would divide the tumor but not so in the extraperitoneal variety. It was like a child's head impacted in the pelvis. It was adherent to the capsule. I had already tied off the uterine arteries, and the other vessels could not be located before or during the operation, and in attempting to remove the tumor we tore them. This tumor was low in the pelvis with the uterus perched above, taking the ureters high up, out of the pelvis. In such a case I think it is utterly impossible for anyone to say what they would do beforehand. If any of you gentlemen had been associated with me in this case, or had seen the condition, you would have realized the difficulties we encountered. The case was puzzling to me. Perhaps I deserved such a lesson because recently I had read a paper before the Washington Obstetrical Society in which I reported one hundred cases of hysterectomy with two deaths. I was trying to get a hundred cases with one death or no death, and you will not be surprised when I tell you that I have had two deaths near together in my hysterectomy experience.

We believe that a wandering retroperitoneal fibroid cannot become "parasitic" because it cannot become attached to an organ because it has no capsule, while an intraperitoneal tumor always has a capsule and a new blood supply is furnished. This variety has no possible blood supply; it becomes entirely independent. We know that intraperitoneal fibromata may exist in the peritoneum without attaching themselves. This variety is the nearest approach I have ever seen to that of a tumor having an independent existence.

GOITRE: WITH PRELIMINARY REPORT OF ONE HUNDRED AND EIGHTY-TWO OPERATIONS UPON THE THYROID.

By C. H. Mayo, A.M., M.D.,
Rochester, Minn.

But a few years ago a reviewer of the surgery of this country would have said that the United States was singularly free from diseases of the thyroid gland. To-day in comparison with the past, from the number of cases and operations reported, they would seem to be greatly on the increase. Similar statements could be made concerning diseases of the prostate gland and other conditions, all of which we know merely show a gratifying state of knowledge and surgical progress.

The surgery of the neck never seemed to enjoy the popularity of that of the abdomen, and goitre operations are not even to day sought by the majority of surgeons. Those who were competent did not sufficiently often encourage operative relief until the absolute necessity rendered the mortality so high as to be almost prohibitive. The lay impression became such that operative measures were permitted only in the most advanced cases while semi-surgical, medical, mechanical, and electrical treatment flourished. In most cases death came slowly and was looked upon as a relief from suffering, a result which satisfied everybody; but the death which follows operation is a shock to all and in but few instances is there a consideration of the fact that medical treatment has previously failed. Neither is

the urgent necessity of the operation or the desperate condition of the patient taken into account, but the death is made a debit against the surgical side. Especially is this true in cases of exophthalmic goitre.

Surgery of the thyroid is one of the most satisfactory operations made, giving immediate relief with brief disability.

The best known surgeon of to-day is Kocher and wherever his name is mentioned the first thought connects it with the removal of goitre. It is through his monumental work in this line that his reputation travelled far and wide.

Among ordinary goitres, in seventy operative cases prior to 1850, Kocher placed the mortality at 40 per cent. In 400 operations between 1850 and 1883 it fell to 15 per cent., and since 1883 has dropped to less than 3 per cent., Kocher's own being 0.2 per cent. In Riverdin's report of the causes of death in ninety-three cases, respiratory conditions, suffocation, and pneumonia caused forty-three deaths; hemorrhage, nineteen; infection, thirteen; shock and nerve injury, nine; cardiac failure, six; while only four were from tetany and myxœdema.

The diseases of the thyroid gland can be classed in a few groups—functional derangements, inflammations, hypertrophies, and tumors. Each of these groups presents material for most exhaustive study and very much has been written concerning them in monographs and books on the ductless glands and various types of hypertrophies and tumors. The present paper being upon the general subject of goitre we will only briefly discuss that which is of interest in relation to operative work.

In Europe there are certain localities which present such large numbers of people with goitre that the disease is considered endemic, and while it is said to be due to the use of waters from the mountainous districts, the disease is also endemic in some of the flat countries, as in the Indian Punjab and plains of Lombardy. Hereditary influences may also

play a part. In the United States there are no such marked localities. The disease occurs in all regions and climates, among rich and poor, food and water having apparently no definite relation to its cause. Some regions appear to have more than their due proportion from possessing more accurate medical observers. The same may be said of exophthalmic goitre, whic his often attributed to shock with about the same proof that birthmarks follow maternal impressions.

Development.—The thyroid gland is developed from a medium process of the pharyngeal hypoblast which bifurcates below and forms pyramidal lobe, isthmus and part of each lateral lobe, the remainder and greater part being formed from lateral outgrowths from the pharynx. In most vertebrates they remain distinct but unite in the mammals, the various portions being fused in the human embryo at about the seventh week. In some cases the fusion is incomplete and separate thyroid bodies are noticed laterally or below the normal location. In others one or more lobes may be missing. The foramen cæcum in the tongue marks the point of inversion and the remains of a disappearing structure, the duct or tract of the gland. It is in these lines of inversion, like branchial cysts, that accessory thyroids are found and in the upper tract especially are so often the cause of serious conditions, as when found in the tongue and also in the median line of the neck above the isthmus. The so-called pyramidal lobe is present in from 30 to 40 per cent. of all people.

Anatomy.—The thyroid body is somewhat like a horse shoe in shape and rests upon the trachea with one lobe on each side connected below by the isthmus which crosses the upper tracheal rings. These lobes are about two inches long, being smaller at the upper pole. The right one is usually the larger and the entire weight is from one to one and one-half ounces. The gland is invested by a thin fibrous capsule which divides posteriorly, a portion lining

the posterior and inner surface, while a part passes to the opposite side behind the œsophagus. A thin layer may also pass between the trachea and œsophagus. This investment explains the production of pressure from tumor growths upon both of these structures and the occasional appearance of tumors between them. Fibrous bands also unite the gland to the trachea which cause the thyroid to move with it. Trabeculæ of connective tissue pass into the gland structure and subdivide into the framework for the alveoli and small vesiculæ and serve as a space for the lymph channels which extend throughout the gland performing the function of the ducts of this organ, as has been pointed out by King, Horsley, and Hurtkle. They have shown that these channels contain the same colloid secretion as is found in the gland vesicles.

The blood supply of the thyroid, considering its size, is remarkable for its extent and also for the freedom of anastomosis. The superior thyroid artery from the external carotid supplies the upper pole on its inner side dividing and entering the capsule. The inferior thyroid from the thyroid axis enters the capsule below at the hilus. The main veins are the superior, middle, and inferior, although many others seem to develop in diseased organs. The nerve supply is from the sympathetic. In intimate relation with the right inferior thyroid artery is the recurrent laryngeal nerve, which lies in the space between the trachea and the œsophagus and is so often affected by pressure of tumors, by operation, or scar tissue as to cause hoarseness. On the left side the recurrent is usually more deeply set and not in such close relation to the artery, as was pointed out by Sifton.

Parathyroids. In each side of the neck behind or within the investing capsule of the gland are the parathyroids, two small gland-like bodies somewhat resembling in structure the suprarenals. Little is known concerning them but they appear to be closely associated with the thyroid in function and it is probable that when the whole of the thyroid

body is removed and the operation is not followed by untoward consequences the patients have active parathyroids or accessory thyroids. It is claimed by Humphrey that a fatty degeneration of these bodies is found in Graves' disease.

Function and Secretion. There has been much written upon internal secretions and while our knowledge has continuously grown there is still very much to learn about the ductless glands. A consideration of the functions of the various structures of the body shows that they are controlled by accelerator and depressor nerves, stimulating and inhibiting forces. Every muscle action to be effectively controlled is balanced by another which opposes it. In other words, there must be a constant equilibrium of forces. When we consider the effects of the secretion of the suprarenal gland with that of the thyroid it would seem that in several respects they oppose each other. Such a fact explains to some extent the condition of cretinism in which from lack of a functionating thyroid there is an arrest of development. Through the unapposed action of the suprarenal bodies there is a capillary contraction with circulatory starvation which affects the cerebral cortex as well as other tissues. The intermittent feeding of thyroid extract causes increased growth and general improvement in appearance with considerable mental development. The mental development is only sufficient in most cases to convert a passive, helpless imbecile into an active, restless and destructive idiot. The loss of the function of the gland seems to be cause for more serious consequences in the young than in those who have reached their complete development. Young adults who lose their entire thyroids retrograde in intelligence while the older individuals frequently develop myxœdema, in which we have the myxœdematous condition of the skin and subcutaneous tissues, dry skin, loss of glandular activity, loss of hair and mental dulness. Apparently these cases are often overlooked unless well developed.

Kocher reports 70 per cent. of cachexias in thirty-four cases of total excision. Garre reports 50 per cent. in sixty-seven cases. Billroth had fifty-two cases develop tetany, with nine deaths, and eleven developed cachexia. The London Myxœdema Committee only found 24 per cent. in two hundred and twenty-four cases of total excision.

Considering the remarkable conditions which occur from a loss of the secretions of the thyroid, we are not surprised at the serious derangements from an over-secretion or an abnormal secretion. In 1835 Graves and five years late Basedow more thoroughly described the disease known by their names or by the term exophthalmic goitre. It occurs about eight times as frequently in women as in men and the greater number between twenty and forty years of age. It is not markedly hereditary, and while shock may be a contributing factor it is difficult to elicit a probable cause in most of the cases.

There are several symptoms in Graves' disease which alone may occur in other conditions, yet alone or associated lead the diagnostician to consider the possibility of exophthalmic goitre. They are the enlargement of the thyroid, tachycardia, exophthalmos, muscular tremor, and general nervousness. The gland is usually enlarged, but may not in exceptional cases be palpable.

With the exophthalmos may occur Von Graefe's symptom, the lagging behind of the upper lid in looking down, or Stellwag's sign, the retraction of the upper lid. Moebius described an occasional insufficient accommodation without diplopia. Exophthalmos may be absent in 20 per cent. of the cases. The heart action may vary from 90 to 180 per minute, a case of medium severity being about 120 to 140. Systolic murmurs are not uncommon. Muscle tremor is easily elicited even in mild cases by having the hand extended, fingers spread palm down.

Associated symptoms are excessive perspiration, occasional temperature, and digestive disturbances—chief of which are

vomiting and failure to assimilate. Attacks of sudden diarrhœa are not unusual. The onset of the disease may be rapid, that is during a few days, or it may be over an extended period of time before being noticed. Many medical men still consider the disease to be a probable intestinal toxæmia and look on the goitre as a coincidence, although all of the symptoms may be produced in healthy individuals by feeding thyroid, and even exophthalmos is now recorded as following the administration of dried thyroid for obesity.

The gland in a typical case usually presents the true hypertrophy, a wonderful increase in cell activity, and the cell areas in the vesicles are greatly increased by infolding. The cell form also changes in shape. The gland is dry and hard after removal as compared to the ordinary juicy colloid or adenomatous condition. The association of enlarged thymus in these cases is not definitely understood.

We have operated upon exophthalmic goitres where the tumor was hardly palpable and have been surprised at the increased size of the gland over the normal when exposed. After all it is a question of increased secretion, absorption and delivery by the lymphatics, not necessarily the retention and development of a tumor. It is a question if the failure of lymph absorbents in certain areas may not, following hemorrhage or increased secretion, play a part in the production of some types of cysts. Graves' disease may occasionally develop in a case of goitre of long standing and then there are diffuse areas of hypertrophy in the general tumor.

A fibroid condition of the gland may follow recovery from Basedow's disease and the consequent loss of function later may cause myxœdema. Ord and Mackenzie tabulated fifty-six medical cases of Graves' disease which had lasted five years or been fatal. There were ten recoveries, eleven made incomplete recovery. In thirteen there was considerable improvement, four unchanged, and fourteen cases died, or 25 per cent. Others make more favorable reports.

With the general hygienic and therapeutic treatment of exophthalmic goitre we like the action of belladonna. We also make use of the *x*-ray. From its known action upon the lymphatics and the glands it exerts a favorable effect upon the over-activity of the gland in Graves' disease and in some cases seemingly develops something of a capsule and partially changes the character of the tumor. While its effect may not be permanent it is a valuable adjunct in preparing advanced cases for surgical procedure. We have had no personal experience with the use of serum from thyroidectomized animals or milk from thyroidless goats. The cases and reports we have seen have given conflicting and not convincing evidence. J. Rodgers, of New York, is now experimenting with a thyroid serum which it is claimed is especially valuable in exophthalmic goitre.

There is a type of thyroid, usually enlarged throughout the whole gland, appearing at about puberty and during the succeeding ten years, which Bloodgood calls simple goitre. In these cases dilated acini are filled with comparatively normal colloid. Similar conditions often occur in pregnancy. In most of them the tumor disappears without treatment. Obstinate cases can be cured by some external application or treatment with iodine or organotherapy. In fact it is reported (Bull's system) that Kocher claims that 90 per cent. of all goitres can be so improved by medical treatment as to render operation unnecessary.

Typical exophthalmic goitre may also exist as a symmetrical enlargement. The irregular enlargement may be adenomata, cysts or unevenly developed colloid goitre. Malignant disease in the thyroid also occurs in irregular enlargements, and Bloodgood states quite truly that when the disease has progressed so far that a differential diagnosis from benign tumor is possible it is also probable that it is too far advanced to cure. Early operation should be advised for irregular nodular tumors. Sarcomas may be more uniform in appearance and cystic. Most of the bulging tumors evenly

rounded and covering the front of the neck are the cystic or colloid cystic type with a heavy capsule in which may be a thinned-out layer of the remains of the gland.

In some cases pressure atrophy seems to have destroyed all of the gland, yet as complete removal of these encapsulated masses or cysts does not often cause myxœdema, it is probable that the system becomes accustomed to the very gradual withdrawal of the thyroid secretion.

In three cases we have removed all of such encapsulated growths without tetany or cachexia, although it is possible that the parathyroids or accessory thyroids were carrying on the function. One of the three was a large single cyst, the other two were cystic colloid, one measuring twenty-two and the other ninteen inches across the tumor from one side of the neck to the other.

Loss of voice from tumor pressure occurs more often in malignant than in other tumors. The adenomatous growths, fetal and cystic, are quite common and represent a variety of goitre frequently found in children and young adults. Parenchymatous enlargement when lobulated can be mistaken for adenoma. Cysts may follow hemorrhage but more commonly develop from adenoma and colloid degeneration.

Echinococcus is infrequent but must be considered. The necessity of a second operation upon goitre is rare according to Bergeat, being required in only twelve cases out of six hundred. Wolff states that when one-half of the gland has been excised for hypertrophic goitre the remaining half always diminishes. This is confirmed by Riverdin, Kocher, Poncet and Wolfer. It has also been our experience.

We do not believe in the semi-surgical treatment of goitre, that is, the injection, puncture, and drainage methods, which are nearly as dangerous as radical operative measures. Exothyreopexy or open displacement of goitre, Jaboulay's method, is merely mentioned.

For the Relief of Graves' Disease.—The removal of the cervical sympathetic ganglions as advocated by Abadie

and Edwards and popularized by Jonesco and Jaboulay we have not considered as effective as the operation upon the diseased organ itself. Rehn's report makes it less than half as favorable. Surgeons do not seem to appreciate the effect of these operations and the ligation of arteries, also the experimental work on the parathyroids, in destroying the lymph channels draining the thyroid.

Division of the isthmus for the relief of pressure is not effective as the pressure is on the sides of the trachea and not on the top.

During the past seventeen years we have operated upon one hundred and eighty-two thyroids, with nine deaths. Of these fifty-seven were for exophthalmic goitre, with seven deaths in all and but one in the last twenty-three cases. Two deaths in the early work were from accepting almost moribund cases as surgical risks. Among the remaining one hundred and twenty-five operations, representing cysts, colloids, adenomata, parenchymatous and including five malignant tumors, there were but two deaths, one on the eighth day from pneumonia, the other from tracheal collapse following removal of carcinoma. One case was a large lingual thyroid, three were tumors of the pyramidal lobes, two only were accessory thyroids in the superior line of inversion, two were incisions and drainage for acute inflammatory conditions, two were for sarcoma.

During the year 1905 there were thirty-eight operations on the gland. Of these there were fifteen cases of Graves' disease, as follows: Six were parenchymatous hypertrophy apparently throughout the whole gland; the other nine cases had areas of parenchymatous hypertrophy but portions of the glands showed colloid and cystic colloid. Apparently the essential feature of exophthalmic goitre is hypertrophy of the whole or portions of the gland with the evidence, from changes in cell structure, of an excessive activity of function.

We have been much pleased with the results of the sur-

gery of Graves' disease. Of those who survive the operation, 50 per cent. make an early recovery of all symptoms, 25 per cent. improve of the main symptoms during several months and 25 per cent., while greatly improved, have occasional temporary relapses of the tachycardia and tremor. The exophthalmos is often one of the last symptoms to disappear.

Of the twenty-three cases operated upon for other causes there were two sarcomas, one adenoma carcinoma, one fibrocystic hypertrophy, two colloids, ten cystic goitres, four cystic colloids, one parenchymatous hypertrophy, and one adenoma.

Anæsthetic. The choice of an anæsthetic is more often determined by the idiosyncrasy of the operator than the necessity of the case. There were thirteen operations made with cocaine infiltration. Of these cases three were completed with chloroform. While there are occasional cases in which local anæsthesia may be necessary, we have noticed but little difference in the shock or general condition of the cases from the anæsthetic employed. We now use ether anæsthesia, preceded twenty minutes by hypodermic of $\frac{1}{6}$ of a grain of morphine and $\frac{1}{150}$ of atropine. The table is placed in an elevated slanting position with the head up (reverse Trendelenburg). The tumor is rendered prominent by a roll beneath the neck if it does not interfere with respiration.

Operation. We prefer the collar or transverse incision. In median tumors this crosses the centre of the tumor, in larger tumors it crosses the upper third and the lower flap is split vertically to the sternum.

The incision is through skin and platysma muscle, the flaps being raised to freely expose the muscles covering the gland, namely, the sternohyoid and thyroid, the inner portions of the sternomastoid and omohyoid. In medium-sized growths muscle separation will permit of the delivery of the tumor. But it is a great mistake in dangerous goitres or

exophthalmic cases to allow any of the muscles of the neck to interfere with the most careful work on the gland. After severing they can be united by suture.

The more firm and rounded tumors with a strong capsule can be readily enucleated after incising the capsule and penetrating the gland tissue to the cyst. We usually loosen the gland from the outside of the capsule first. Upon exposing the tumor the true capsule has the lustre and appearance of peritoneum. If one is not sure, incise between the vessels. Should hemorrhage be severe lifting up the tumor by its capsule will reduce the bleeding until sutures can be placed for its control. In parenchymatous and colloid tumors we make extirpation of one lobe and the isthmus. After exposing, the upper pole is elevated and the superior thyroid artery is cut between the ligatures. The lateral veins are clamped and cut, the lower pole is elevated into the wound, incision is made along the outer posterior border, and the capsule is brushed off with gauze to the median line. As a rule the inferior thyroid is now ligated close to the tumor as the capsule is brushed back. This leaves the nerve behind and usually out of sight. The isthmus is clamped and closed by suture. If the enucleation method for adenoma and cysts leaves a badly torn lobe it can be removed. Sometimes extirpation of one lobe is made and enucleation of cystic masses is done on the opposite side, after the method of Porta, Billroth, and Socin. The resection method of Mikulicz was only employed in one case but with good result. The ligation of the thyroid arteries as a method was not practised. We avoid rough handling of the portion of gland to be left.

Should there be a large area of cut gland exposed it is burned over with carbolic acid followed by alcohol or often Harrington's No. 9 solution is applied over the cut tissues to close the lymph absorbents and favor drainage. If there has been but little traumatism we do not drain. Large incisions and large cavities we drain temporarily. All exoph-

thalmic cases are drained as freely as the most septic wound.

These cases absorb some wound secretion containing colloid causing temperature and increase of pulse the next day. To delay absorption, especially in Graves' disease, they are given large quantities of salines by the bowel directly after the operation and for the first two to four days. If not retained by the bowel they are given subcutaneously.

The wound is closed by subcuticular suture, great pains being taken to unite the platysma to prevent spreading of the scar.

DISCUSSION.

Dr. George W. Crile, of Cleveland.—Dr. Mayo's paper appeals to me as a valuable one. In simple goitres one scarcely expects a fatality from excision—not so in the exophthalmic variety. Experience is teaching us in this field as it has in the field of acute appendicitis, malignant tumors, etc., that there is a distinct limit to surgical possibilities. After a certain stage of toxicity has been reached the added stress of a surgical procedure cannot be borne.

Dr. Mack Rogers, of Birmingham.—I rise more to ask a question of the author of the paper than to comment specially on it. While he hinted at the parathyroid bodies, he did not dwell upon them. I have read in my literature of late that quite a little stress is laid upon the parathyroid bodies. Having little experience in this line, I do not know to what extent they operate after the removal of the gland lobes. We are taught that the parathyroid bodies are in a sheath, separate and distinct, either one or two on either side, and if they are carefully avoided in an operation,if we leave them *in situ,* and get rid of the gland proper, they soon take on and perform the functions of the thyroid bodies.

I am well aware that Kocher probably has done more work in this line than any other one man. But recently some writer has said that in an interview with him, he brought out the fact that he was now preserving these parathyroids with a great deal of precision and care, hoping thereby to obtain better results than he had been securing heretofore. I would like to ask

the men who have been doing extensive work along this line what their observations have been with reference especially to these parathyroid bodies?

Dr. J. Shelton Horsley, of Richmond.—In one case I did the Jonnesco operation. This case has been reported. Some of these operations are dependent upon a different pathology, and it seems to me that phase of the subject ought to be considered. Jonnesco in speaking of the pathology says that exophthalmic goitre is not primarily a disease of the thyroid gland, but that it is central, and is located in the medulla, and that its morbid impulses coming through the sympathetic nervous system produces an excessive secretion in the thyroid gland. In order to overcome that, his idea is to interrupt permanently the morbid impulses from the medulla, and to do this he excises the sympathetic cervical ganglia. If that is true, it would be useless to excise the thyroid gland, when it is merely a symptom. On the contrary, the thyroid gland is the main thing at fault and the symptoms are the results of excessive thyroid secretion, the logical treatment is removal of the thyroid gland.

The case I operated on was a typical instance of Graves' disease, with a pulse ranging from 140 to 150. There was enlargement of the thyroid marked exophthalmos, von Graefe's sign, and other classical symptoms. The case was operated on under general chloroform anæsthesia some years ago. I excised the superior and middle ganglia on the right side. The patient's condition was so bad at the end of the operation that I did nothing else. The patient improved in every sense, except the thyroid gland did not diminish in size. There was improvement both in the exophthalmos and in the tachycardia. After about eighteen months retrogression set in, and at the end of two and a half years the patient was nearly as bad as at first. While, of course, this does not prove anything, because the other side was not operated on, it shows there was improvement either because of the nervous impression resulting from the operation (as after trephining epilepsy is temporarily improved), or from interruption of the trophic or secretory impulses when the nerves were excised, or else from injury to the lymphatics during operation as suggested by Dr. Mayo.

The two cases of Dr. Crile were both very interesting. The second case might be explained in this way: the irritating material

i. e., the anæsthetic or its products circulating in the blood, may have caused an excessive secretion of the thyroid gland, and so account for the increased symptoms. Or the anæsthetic may have impaired the function of the kidneys and excretory organs and so caused an undue accumulation of thyroid secretion in the blood. Either one of these things, or probably a combination of them, could explain the death.

Dr. W. P. Carr, of Washington, D. C.—It would seem that the cases reported to-day go a long way toward showing that Graves' disease is due to affection of the thyroid gland itself.

I operated on a case of exophthalmic goitre several years ago, removing the superior and middle cervical ganglia without any difficulty. In that case there was a little improvement for a time, as in the case cited by Dr. Horsley. But the symptoms returned. It is easy to understand how by removing part of the sympathetic nerve, in this way, we can have a diminution of the heart's action, although the poison from the gland is still operating. But so far as I can learn there have been no permanent successes from operating on the sympathetic nerve. The fact that this operation does not give permanent relief, and that removal of the gland does, seems to me strong evidence that the trouble is in the gland itself, and not of central origin. I was glad to hear Drs. Mayo and Crile speak against the use of local anæsthesia for thyroidectomy. I believe the shock to the sensitive nerves is more dangerous than the administration of ether would be.

I had a case not long ago of a woman upon whom I was about to operate whose temperature went up to 111, and she died after being in convulsions for five or six hours. I did not operate on her.

Dr. Wm. L. Nolen, of Chattanooga.—I want to express my appreciation of this admirable paper. It brings before us one of the most important subjects with which we have to deal at the present day.

I have had an experience with two cases, recently operated upon, both living and materially improved. This work may not appeal to the average surgeon who has not seen Dr. Mayo do these operations. In the hands of most surgeons the death rate would have been greater than that he has reported. He

does this work unlike anyone else, and has obtained excellent results considering that this disease is so frequently fatal.

Dr. Joseph Ransohoff, of Cincinnati.—I have been very much interested in the paper of Dr. Mayo, particularly with reference to the operative treatment of cases of exophthalmic goitre, although I have seen some remarkable results from medical treatment. Prof. Forchheimer, of Cincinnati, who has made a study of these cases, has succeeded in relieving many of them by giving hydrobromate of quinia, and when this agent is given for a long time it acts frequently as a charm. I believe it is necessary for us to operate on these cases at times. We must do it, if we expect to give them any relief.

While I have not anything in particular pertaining to this subject to report, I am happy to let my pony-cart be placed on Kocher's fast train and follow him wherever he leads. Perhaps there is no one single man either in this country or elsewhere who has done more with regard to the operative treatment of goitre than has been done by Kocher. I saw him do five operations in one morning, and asked him how many he had done in a morning. He said to me, "One morning when I was feeling particularly good I did twelve operations on cases of goitre." Now, when a man does as many operations for goitre as Kocher has done I think we can safely abide by what he says.

In my exophthalmic goitre cases I have invariably operated under cocaine anæsthesia, and notwithstanding the statement that has been made upon this floor, I am content to operate on these cases under cocaine anæsthesia until I have some bad results. I cannot exactly understand the logic of Dr. Crile's argument. In fact, I think I could find a little flaw in his argument of why he does not operate on bad cases. It is the bad cases that require operation. We see cases of this disease that are going on from bad to worse, and we know that in a short time, if something is not done, they will terminate fatally. Shall those patients be deprived of the chance of recovery, simply because they are not good surgical risks? I do not think Dr. Crile thinks of his mortality statistics in cases of this kind, because most of us will have fatalities from this operation. If we do not accept a fatality occasionally, we will certainly

deprive many of these patients of the opportunity of getting well. I myself, although Kocher says to the contrary, do not think that a patient is often so bad that an operation is not justified. Of all my cases of exophthalmic goitre, I have lost one. That patient had a condition which I have not seen described elsewhere. It is a condition of profound jaundice, the only case of exophthalmic goitre I have ever seen in which jaundice existed.

There is one other point that is particularly interesting, and I hope Dr. Mayo will touch upon it again in his closing remarks. He stated that in some of his cases of goitre he had cystic disease, and the cases were distinct Basedow. Basedow's disease does not present any cyst. It is purely a hypertrophic disease of the gland, with extreme vascularity of the gland, which is the marked feature. In true exophthalmic goitre there is a pulsatile thrill in almost every case. I do not think, therefore, that cystic disease in these cases is common. Of course, we do get something like the exophthalmos in cases of ordinary goitre, but it is the so-called false exophthalmos which was described long ago. Even in those cases there is some change in the condition of the normal gland tissue that becomes hypertrophic. In that way we may have supplanted on an old goitre true Basedow's disease in which we do not have cyst. I trust Dr. Mayo will touch on this point when he closes the discussion.

Dr. Horace J. Whitacre, of Cincinnati.—I want to report one case in particular of exophthalmic goitre which came under my care more in response to what Dr. Crile has said in discussing Dr. Mayo's paper than anything else. My experience with exophthalmic goitre has been rather limited, but it happens to include three extreme cases almost of the type mentioned by Dr. Crile, in all of which the pulse was exceedingly rapid. In one case the patient was so extremely nervous that the question was under consideration whether the woman should be placed in an insane asylum or not. This woman had been treated for several years medically without improvement, and she has been in a semi-insane condition for several months. I operated and removed one gland under cocaine anæsthesia. The woman recovered from the operation promptly, and in two months thereafter returned to a condition of perfect sanity. It is now

a year and a half since the operation was performed and she is in perfect health.

The other two cases were extreme cases. One woman, who was operated upon a little more than a year ago, has given birth to a child in a perfectly normal manner. I have always operated under cocaine anæsthesia, have taken particular pains not to press on the gland during enucleation, have secured accurate hæmostasis, have always used drainage, and thus far have had no mortality.

Dr. Mayo (closing).—As to the matter of the parathyroids, there are four very small glands, two on each side, and I must say that in nearly all of my surgical work on the neck it has been a rare thing in working in that region to be able to recognize them. In fact, it is a difficult matter to do so. To anyone doing this work I would say you must be careful to remove the whole area in postmortem examinations and do the dissection afterward.

The recent Bradshaw lecture in England was on the subject of exophthalmic goitre, and the author of the lecture went into the question of serum therapy and thyroidectomized animals, making use of goats' milk, fresh and dry. Murphy, of England, says that in the autopsy work he found fatty degeneration of the parathyroids in cases of exophthalmic goitre. That is a new thing. It has been reported in a few cases, and has been verified by other examiners. Of course, we cannot go into the question of experimental work on the parathyroids because different observers have arrived at different conclusions.

The question of anæsthesia is a most important one. I have reported thirteen cases in which operations were done under local anæsthesia; but I have not used local anæsthesia in any of my last 100 cases. We have regular anæsthetists, three upon whom we can depend, so that I can devote my entire attention to the surgical work. If I could not rely on someone, at all times, to give the anæsthetic in these cases, I might be influenced to use local anæsthesia in my work more than I do at present. Reference has been made to the fact that Kocher in the last few years has been using local anæsthesia in these cases; but Kocher, often does not use local anæsthesia in his private cases.

In 1895, Kocher reported 900 operations for the removal of goitre under chloroform anæsthesia without a death from

the anæsthetic. In all the work which Kocher has done under ether anæsthesia he only reports one death from bronchitis following it. Of course, in that country where goitre is endemic the surgeon sees many cases. But it is a different type of goitre from many seen in this country. It reminds me very much of the man in India who after he had been away on a vacation for some time, on returning found waiting and did 140 cataract extractions in three days. Cataracts in India are very common. It is said that half a dozen men have operated on as many as 12,000 to 20,000 each.

We do not necessarily make the diagnosis from the goitre alone. The point I wanted to make was that the ductless glands depend upon the lymphatic system; that where we have an active lymphatic system and secretion is formed it is unnecessary to have tumor growth to show the results of hypertrophy or failure of delivery through the lymphatics of the secretion formed by such a gland. The suprarenal glands are full of lymphatics. All the ductless glands are filled with lymph channels. Many cases are on record where nature cures Graves' disease, and follows it by fibrosis, the same as syphilis will produce cutaneous or exuding white cells, the development of connective tissue along the lymphatics, with contraction and final fibrosis. There are cases of myxœdema on record following nature's cure of exophthalmic goitre. But one element which is present in all exophthalmic goitre is hypertrophy in limited or large areas of the goitre. There are certain areas of hypertrophy which cannot be distinguished from those in which the whole area is involved, so that in one case, who has had a tumor for several years, you will see the sudden development of an acute exophthalmic goitre, with every symptom you could wish for to make a diagnosis. There is no use saying that the larger area of the gland is not typical of true exophthalmic goitre You are bound to find in some tumors certain hypertrophic areas that are all alike.

As to the question of sympathetic resection, I cannot help but think that when this gland is doing the work through the ducts, largely the lymph system, it is impossible to make a thorough dissection without their interruption. Take the parathyroid work; take the removal of the sympathetics, in which some surgeons have done their work so thoroughly, and some

have half done it, and some have worked at the top, where it is expected to cure epilepsy, they have injured the lymphatic system, and while this cure will not continue in all cases, primary improvement will be shown in some. The only trouble with sympathetic resection is, it cures so many diseases. It is said to cure epilepsy and glaucoma. We cure too many affections by one method. If we take pains to look up some of the cases we will find half of them said to have been cured were reported very early. The cures were temporary not permanent. As has been pointed out, the operation of circumcision will cure a certain number of epileptics for a while. Following anæsthesia, there is certainly a change in the circulation, and absorption from the body tissues, glands, etc., no matter where the fluids are. The lymph plasma, as we call it, is again taken up and distributed, and that particular period is the time when death takes place. They do not re-absorb. They pick up the fluids in the body following anæsthesia. They do it early, coming on an hour afterward. If they absorb thyroid secretion, then there is certain trouble. That is why, like in the septic cases, if you can overload the circulatory system with fluids before the blood has time to pick up from the septic area you will get ahead of absorption. You will produce elimination at the time you need it. By overfilling the circulatory system, you limit the septic areas and eliminate the septic products before they had time to do much damage.

As to medical treatment, Dr. Ransohoff has said that his two last cases got well. They might have recovered under surgical treatment. Numbers of these patients die without operation. I have seen two cases in the last year on which I refused to operate. One woman was brought into the office, but she was in such a condition that I immediately sent her home. She was taken home on a stretcher, and died three days later. The other patient was not operated upon. Death ensued four weeks after. If a surgeon should take such cases as those I have mentioned and operate on them his results will be very little better than those obtained from medical treatment.

In a recent issue of the London *Lancet*, you will find an article on the treatment of exophthalmic goitre by serum therapy. Different methods of treatment are mentioned in the article. The author has only had three cases which were turned over

by him to surgeons, and all died, so that while some of these patients get well, most of them get well of themselves without any treatment.

As to goitre in the insane, I have had several such cases, the women having improved for a year or two. You will have the same thing almost after any type of operation on the insane; a few patients will get better from operations. Patients with circular insanity are easily stirred up. If anything goes wrong the insanity will recur. The removal of the uterus sometimes results in great improvements in the mental condition of a patient. I have been greatly pleased with the results I have obtained from operations in a number of asylum cases of different types of goitres, not necessarily exophthalmic goitre. After an operation for the removal of cystic colloid goitre several patients have been sufficiently improved to leave the asylum.

Dr. Crile.—In the graver cases in which you decline to operate you decline because you believe you will shorten life, do you not?

Dr. Mayo.—It brings surgery into disrepute not to acknowledge our limitations, as, for instance, in some cases of cancer and other conditons. Physicians advise some of these patients to put off having operations performed. They make light of early operation on these points, and we cannot get them to see the importance of operation until the disease is far advanced, and then the responsibility of operating is so great that they are unwilling to accept a part of it. It is better for surgery to have some patients die in order to impress upon the laity the important fact that certain conditions, if taken early, can be successfully operated upon. I think we have implanted this idea into the minds of the laity with regard to early operations in cases of appendicitis. Some patients no longer wait for a physician to urge operation, but they make up their minds to have it done themselves.

As to the question of death in these cases, I do not think we should take patients and operate on them unless we have a reasonable assurance that they are going to live. When we know that a patient is almost surely going to die, or after we have worked on them for two or three months to get them ready for an operation, and find that we cannot secure a surgcal condition, then I woud not operate. The disease may be too far

advanced for us to run the risk of death at a time when we are developing in this particular field, just as we developed in appendicitis work, in gall-bladder work, etc. When we are developing along this line, it will not do to lose too many patients, because if we do we will set back operations for this disease ten years.

As to the time of death, in the bad cases, it may occur within an hour after operation, or there may be sudden death on the table from myocarditis, from over-whipped heart, or death may take place ten hours after from continuous shock and absorption, regardless of the anæsthetic. Even when the operation is done in the forenoon, I have had deaths occur at midnight or the next morning from both general and cocaine anæsthesia. Where there is continuous absorption following any type of surgical operation you will have the absorption of plasma no matter where it is located.

THE DIAGNOSIS OF RENAL CALCULUS.

By Guy L Hunner, M.D,
Baltimore, Md

Few diseases present such protein symptoms and simulate such a varied array of other maladies as stone in the kidney. This is particularly true if we include in our considerations stone in the ureter.

The smallest stone may cause typical agonizing symptoms not easily mistaken even by the patient, while without attracting notice large stones may occupy both kidneys, causing insidious destruction of these organs and sudden death from anuria. In the consideration of this subject I will first discuss the diseases of the kidney which we must differentiate from calculus nephritis, and will then take up those diseases of neighboring organs which most commonly mislead us in diagnosis.

The more common kidney diseases of which we must always think in making a diagnosis of stone are tuberculosis, pyelitis, pyelonephritis, and pyonephrosis from the ordinary pus-producing infections, tumor and intermittent hydronephrosis.

Tuberculosis. At our Atlanta meeting two years ago I had the pleasure of reporting thirty-five cases of tuberculosis of the kidney, occurring in the practice of Dr. Howard A. Kelly and his associates in Baltimore. It had been my privilege to study the urinary condition in most of those cases, and you may remember that I laid emphasis on the importance of urinary examination in making a diagnosis of renal tuber-

culosis. The same law holds in renal calculus—we must study the urine.

Our only positive diagnosis of renal tuberculosis is the finding of tubercle bacilli in the urine or causing the disease in guinea-pigs by the inoculation of the urine or the diseased tissues taken from the bladder. In calculus kidney the urine may show sand or a stone. The *x*-ray and the wax-tipped bougie are invaluable means for making a positive diagnosis, but these methods both fail at times and if we would enjoy a full measure of success in kidney work we must insist on a careful study of the urine.

Blood occurs in the urine in both stone and tuberculosis. The amount varies in both diseases from microscopic quantities requiring both the centrifuge and microscope for the discovery of the few corpuscles present, to severe hemorrhages threatening the patient's life. The amount of blood is more likely to be influenced by exercise in cases of stone, but we sometimes have to search repeatedly before finding a few corpuscles marking the only change in the urine.

Pus in the urine at least in microscopic quantities may always be looked for in tuberculosis, while a large percentage of stone cases are aseptic and free from inflammatory reaction, especially in the early stages, and leukocytes if present can be accounted for by the amount of blood. I have found that some stone cases with only a moderate number of red corpuscles and leukocytes may have a strikingly large number of epithelial cells.

Pain as a differential symptom between stone and tuberculosis is unreliable. In either case there may be entire absence of pain. Either disease may cause only a dull backache or an indefinite nagging sensation in the lumbar region. In either disease the pain may occur in the most severe paroxysms due to blocking of the ureter by a blood clot, by a plug of detritus, or in calculus disease, by a stone. At such times the kidney is likely to be enlarged and the urine may be temporarily clear.

Palpation findings in the kidney region are not characteristic, as in either disease the kidney may be smaller than normal, because of atrophic sclerosis or it may be greatly enlarged from fibrosis, lipomatosis, hydro- or pyonephrosis. Palpation of the ureter is of more value, as a large proportion of the tuberculous cases show thickening of the ureter after the disease is advanced in the kidney. In the infected stone cases the ureter may be thickened and simulate the tuberculous ureter. In ureteral calculus the stone is in the lower end of the ureter in 50 per cent. of the cases, and in women it can usually be palpated through the vagina or the rectum.

In diagnosing a case as tuberculous on the evidence of finding acid fast bacilli in the urine we must always use the differential stain as illustrated by the following case:

Case I.—Mrs. J. B. S., aged forty-two years, married seventeen years, the mother of two children. Admitted to Dr. Kelly's service at the Johns Hopkins Hospital in 1901. The patient had complained at intervals for the past four years of attacks of intense pain in the right lumbar region. She described the pain as labor-like in character, and said that it extended downward toward the bladder, and down the thigh as far as the right knee. The attacks lasted from twenty-four hours to five days. At times they were accompanied by chills, nausea and vomiting, and constipation. During the attack the patient passed but little urine, but had the constant desire, and after the attack a large quantity of urine was noticed. She sometimes had decided blood tinge in the urine during and after the attack. She never passed gravel. There was always sensitiveness in the right hypochondrium during the attacks. The patient came to Dr. Kelly with a diagnosis of renal tuberculosis, a report having been made from a state laboratory that tubercle bacilli had been found in the urine in abundance. Leonard, of Philadelphia, one of our most expert Roentgen-ray specialists, has failed to get a stone shadow. I examined catheterized

specimens of urine without finding pathological content, and the laboratory in question soon telegraphed to defer the operation, as the bacilli had been found to be smegma. At a later admission Dr. Kelly operated because of the symptoms and blood in the urine and found an oval stone about 2 cm. in length in the pelvis of the kidney.

Pyelitis, Pyelonephritis, and Pyonephrosis. It may be impossible except at operation to diagnose any one of these conditions from an infected nephrolithiasis. Indeed, the presence of a stone may cause any of these conditions, and again, a stone may develop because of the infective process. If the history shows the trouble to have begun during or soon after one of the acute infectious diseases, or during pregnancy, or after the development of a pelvic tumor, the condition is more likely to be one of infected kidney. But we cannot exclude the presence of a stone in view of such a history for it is often under the conditions named that an aseptic stone kidney becomes infected and first begins to cause symptoms. The infected stone kidney is not infrequently the seat of such a connective tissue hypertrophy that the *x*-ray picture is simply a large shadow in which no stone can be outlined. This tissue hypertrophy may extend to the ureter and so close its lumen as to prevent the passage of a wax-tipped bougie into the pelvis, as happened in one of my cases.

Tumor. It is by no means easy to differentiate between stone in the kidney and a tumor. Here again our chief dependence is in the examination of the urine. The occurrence of a profuse hemorrhage which begins and ceases suddenly favors the diagnosis of tumor. The presence of a persistent large tumor mass in the kidney region, and the absence of pus in the urine, is a combination of circumstances suggestive of tumor. It must not be forgotten that a comparatively small stone blocking the ureter may cause a marked swelling of the kidney, and be associated with blood and an absence of pus in the urine. In one such case (Case II.,

Mrs. F., June 27, 1904) I found a large tender left kidney and the urine showed considerable blood, many large epithelial cells, some unusually large, and an absence of pus.[1] I made a probable diagnosis of tumor, but the patient refused further examination and in a few weeks passed a stone. The largest swelling of the kidney that I have ever seen (Case III.) was caused by the presence of an enormous stone accompanied by fibrous hypertrophy and pyonephrosis. In examination of the urine on five consecutive days I had failed to find tubercle bacilli in the urine and considered the case one of infected tumor or nephrolithiasis. The wax-tipped bougie was negative, due, as I found after removal of the kidney with a portion of the ureter, to sclerotic thickening of the isthmus which so narrowed the lumen that the catheter could not pass. Microscopic examination of the kidney cortex demonstrated the presence of tuberculous disease.

Intermittent Hydronephrosis. A movable kidney, in which the conditions favor the sudden kinking of the ureter, may give rise to attacks which very closely simulate renal colic due to stone. In either case there may be more or less constant discomfort in the back with the occasional attacks of severe pain followed by blood in the urine. If the patient is carefully watched, however, the diagnosis of Dietl's crisis is favored by finding the kidney misplaced and enlarged during the attack; and its return to normal size and position is accompanied by relief of pain and increase in the amount of urine.

Before finishing the discussion of the more common kidney diseases which may be mistaken for stone, I must mention two other conditions of which I have seen a few examples. Under the designation of "idiopathic hæmaturia" or of "renal epistaxis" are classed those cases of renal hemorrhage for which we can find no cause even at operation. I have seen

[1] See Case II. "The Significance of the Urinary Examination in Women," Southern Surgical and Gynecological Transactions, 1904, p. 489; also American Medicine, 1905, vol. ix. p. 559.

one patient who had become profoundly anæmic from the loss of blood. Splitting of the kidney in her case resulted in at least a temporary cure, although no cause could be found for the bleeding. I believe there is a tendency to-day to classify many of these cases of so-called "renal epistaxis" with the chronic interstitial form of Bright's disease.

Acute monolateral nephritis may be even more misleading than the above condition, because in addition to the suggestive urinary findings we have the acute onset of renal colic.

Diseases of Other Organs. Because of the proximity of the gall-bladder to the right kidney we are not infrequently called upon to differentiate diseases of these two organs. The urine shows blood if we are dealing with stone in the kidney, and bile if there happens to be obstruction in the common duct. The pain is more likely to radiate down the ureter in the one case, and to the epigastrium and up under the shoulder blade in the other. If the gall-bladder is enlarged it is more superficial and has more of a pendulum movement than the kidney. Pressure over a normal liver border may be transmitted to a very tender right kidney and the symptoms be misinterpreted. Except under conditions of special technique, the *x*-ray does not register a shadow for gallstone.

One of the best means for differential diagnosis is that devised by Dr. Kelly of catheterizing the right kidney and forcibly injecting a bland sterile solution into its pelvis. The patient can generally tell very accurately whether the pain thus produced is similar in character and location to the pain previously suffered.

If the pain caused by the injection corresponds to the patient's previous symptoms we have simply found the location and cannot say definitely that we are dealing with nephrolithiasis. An unusual amount of blood after the injection is suggestive of a pelvis already injured by stone. If the wax-tip returns with scratch marks we are certain of stone in the kidney or ureter. If the pelvis holds an un-

usual amount (the normal pelvis takes in woman 120 m., 7.5 c.c., or 2 drachms, before the patient complains of a fulness or discomfort) there is a dilatation which we have found due to various conditions, viz., stone in the kidney or ureter, movable kidney, stricture of the ureter, and tumors of the pelvic organs pressing on the ureter.

The following case, after the kidney investigation, was considered to be one of probable gallstone irritation.

Case IV.—Mrs. A., aged sixty-three years, the mother of several children, was operated on at the Johns Hopkins Hospital in 1897 for acute appendicitis with abscess formation. The drainage wound became the site of a hernia for which she was operated upon in 1900. I saw the patient with Dr. Finney in July, 1904, at the Union Protestant Infirmary. She had been complaining for about six weeks with an indefinite nagging pain in the upper abdomen, more on the right side. She had had no stomach or bowel trouble, no fever or jaundice. There had been some soreness at times over the right hypochondrium. On examination there was general tenderness over the upper right quadrant of the abdomen. We thought of gallstones, and of an omentum adherent to the laparotomy wound in the lower part of the abdomen and causing the symptoms by tugging on the mesentery of the hepatic flexure of the transverse colon.[1] A specimen of urine catheterized from the bladder contained a few pus and epithelial cells. No red corpuscles were noticed. On cystoscopy I found the bladder reddened in areas, and considered these changes sufficient to account for the few pus and epithelial cells found in the urine. Wishing to exclude stone in the right kidney, however, I catheterized this organ with a wax-tipped bougie, with negative results. The urine from this kidney contained no pus and the slight amount of blood present was attributed to the trauma of catheterization. About three weeks after this catheterization the

[1] An Interesting Complication in the Diagnosis of Gallstone, American Medicine, 1903, vol. v. p. 698.

patient had her first severe attack of renal colic, passed a small stone per urethram, and has since enjoyed good health.

Appendicitis. It would seem to the casual observer that disease of the appendix could not be easily mistaken for renal calculus. But we must remember that many appendix attacks are accompanied by little or no elevation of temperature and that the pain may be located in the kidney region. If we include in this discussion stone in the ureter we can readily understand that the diagnosis may become more complicated. The ureteral stone may be lodged on the brim of the pelvis and give local pain and tenderness almost exactly under Mc Burney's point. On the other hand, an inflamed appendix may reach over into the pelvis and cause bladder and rectal symptoms, and on palpation through the vagina or rectum the periappendicular tenderness and thickening may be mistaken for signs of stone in the ureter. The urine is our safest guide in such cases, but I have recently had a most remarkable case in which I was completely misled because of the urine examinations.

Case V.—Miss R., a trained nurse, aged twenty-six years, had complained for ten years of attacks of pain in the right side with a more or less constant pain in the region of the right kidney. I saw the patient in consultation with Dr. Julius Friedenwald in December, 1904. She had had two severe attacks within four weeks requiring hypodermics of morphine for each attack. The attacks which usually lasted several hours began with throbbing in the rectum. This increased to a severe pain in the pelvic region and was followed by pain in the region of the right kidney. With some attacks there had been pain in the bladder. At times there had been vomiting. She had never been jaundiced. She stated that the pain never began in the kidney region radiating downward. There was no very marked soreness anywhere after the attack was over. A number of the attacks had been followed by the passage in the urine of large amounts of pus and blood. After one

of these attacks the urine was catheterized from the bladder and sent to one of the most careful microscopists in Baltimore. He found both pus and blood.

At my first examination the urine catheterized from the bladder was absolutely normal. A wax-tipped bougie passed to the right kidney returned negative, and the *x*-ray picture was negative. The patient was very stout and I felt that the *x*-ray might easily fail to cast a shadow, particularly if the stone were small and of porous formation. While the symptoms pointed to a pelvic location of the primary trouble, I felt that the negative wax-tip was almost positive evidence that the ureter contained no stone; and yet the urine findings after the attacks had been so positive that I considered the case one of urinary tract disease. I therefore began the operation by exposing the kidney and splitting it from end to end. The kidney was large, and indentations on the surface appeared like scars. No stone being found in the pelvis of the kidney nor palpated in its substance I closed this organ with mattress sutures of catgut and explored the ureter as far as the pelvic brim. The lumbar wound was then closed except for slight drainage to the kidney cortex, and turning the patient to the dorsal position I made an extraperitoneal inguinal incision and explored the ureter from the pelvic brim to the bladder, with negative results. I then opened the peritoneum and found an hypertrophied inflamed appendix which, reaching over the pelvic brim, was densely adherent over the ureter. The right ovary was so firmly attached to the peritoneum over the pelvic ureter that I was obliged to free it by scissors dissection. I can explain her attacks of renal pain and hemorrhage only on the supposition that the appendicular inflammation was communicated to the ureter causing a temporary stenosis of this organ, with acute hydronephrosis and evidence of kidney inflammation. A section of the kidney cortex taken from one of the scarred looking areas showed a mild grade of interstitial infiltration with areas of glomerulonephritis. The patient

whose attacks had been increasing in frequency has been perfectly well since the operation.

Intestinal Obstruction. Occasionally an attack of renal or ureteral stone colic causes a reflex paralysis of the bowel, with its attendant meteorism and obstipation. If the attack is accompanied by rectal tenesmus, nausea, and vomiting the picture is still more confusing.

Case VI.—Mrs. K., aged sixty-one years, seen with Dr. Eldred at Sparrow's Point. The patient was taken five days ago with sudden pain in the left flank region. She has had several attacks each day, the attacks being more marked between midnight and 6 A.M. in the morning. Dr. Eldred at first considered the attacks due to stone in the kidney or ureter, but as he was unable to get the bowels moved, and as the intestinal distention and distress grew more marked he began to fear intestinal obstruction. A catheterized specimen of urine was very dark colored. Unfortunately, I did not have a good microscope at hand and did not determine whether there was blood in the urine. The bowels were moved on the day of my visit and about one week later the patient passed a cylindrical stone about 1 cm. long.

Pancreas Stone Colic. Recent work by Opie and others has demonstrated conclusively the intimate relationship between gallstones and pancreatic disease. One would scarcely mistake the typical case of acute hemorrhagic pancreatitis with its sudden onset of acute colicky pains in the epigastrium, nausea, and vomiting, subnormal temperature, or chills and fever, and especially when accompanied by the early onset of severe collapse symptoms, for a case of renal calculus. But the mistake might easily be made in the more chronic cases of pancreatitis. The history of former attacks of indigestion or typical gallstone colic, the location of the pains, the presence of a pancreatic tumor, are all helpful differential points. In the future many cases will be differentiated by the examination of the urine, the kidney stone

cases showing blood, while sugar will be found in the pancreatic cases.

Henoch's Purpura and Angioneurotic Œdema. Both of these conditions are often marked by attacks of gastrointestinal crises and a renal hæmaturia, a combination of symptoms that might easily lead to a diagnosis of renal colic caused by stone.

Case VII.—L. F., Jewess, aged twenty years, married. I saw this patient immediately after her admission to the Hebrew Hospital on March 19, 1905. She was flexed almost double by epigastric pain which two quarter-grain hypodermics of morphine had failed to relieve. The husband said that she has such attacks about once a month. I suspected gallstone colic and on examination found that another surgeon had anticipated my diagnosis. The husband explained that the linear scar in the right hypochondrium had been made at the City Hospital one year before and that gallstones were not found. I then instructed the resident physician to carefully examine a catheterized specimen of urine as he would almost surely find blood as an evidence of stone in the kidney. As I turned to leave, the wife found her Yiddish tongue and the husband said: "O, yes, doctor, please look at the lump on her leg." Situated over the upper end of the left tibia was an oblong elevation of the tissues, measuring about 4 x 6 cm., purple in color, the color disappearing from local areas on pressure and slowly returning. Knowing Dr. Osler to take a special interest in visceral crises in purpuric conditions I asked the resident physician to notify him of the case. "Yes, yes," said the husband, "she has been in the Hopkins Hospital several times." By referring to the Hospital records I found that she had been admitted repeatedly because of attacks similar to the present one. With some attacks she had nausea and vomiting and epistaxis. "Black-and-blue" spots had been mentioned by the family, but subcutaneous bleeding had not been seen at the hosptial, and the diagnosis had always been entered as

"recurring attacks of abdominal pain." The urine during, and immediately after these attacks showed a trace of albumin and hyaline and granular casts, but no blood.

In this cursory and superficial view of the subject I have hoped to throw out enough suggestions to convince you that the diagnosis of stone in the kidney is often a very difficult problem, to be solved generally by a process of exclusion. In closing, I can do no better than to quote a sentence from Israel's introduction to his chapter on the diagnosis of kidney stone colic. He says in effect that if one would place himself in a position to diagnose other cases than those with the typical symptom complex he must first of all divest himself of the schematic picture so often presented in the text-books.

TRAUMATISM OF THE URETER AND PELVIS OF THE KIDNEY, WITH REPORT OF CASES.

By Rufus B. Hall, M.D.,
Cincinnati, Ohio.

Traumatic injury to the pelvis of the kidney or ureter causing postperitoneal extravasation of urine is sufficiently rare to warrant reporting such cases as do from time to time occur.

The writer has been fortunate enough to see two such cases. They were so interesting and the ultimate results have been so satisfactory that he hopes the report of the cases may be of sufficient interest to warrant their tabulations here. The exact location of the injury was not determined in either case, and from a scientific standpoint he realizes that this is a misfortune; but from a clinical standpoint we all realize that for the *best interest* of the patient we must at times neglect the scientific aspect to some extent, as has been done in both instances.

Case I.—H. L., aged nine years, daughter of a dentist was admitted into the hospital, December 9, 1898, with the following history:

The child was strong, vigorous, and well developed for her age, and had always enjoyed excellent health before the present illness. Six days before her admission, while on her way to school, she was passing along the railroad track. As she approached a trestle across a ravine the track at the end of the trestle was elevated on filled ground ten or twelve feet high. The child was running and started

to go down the side of the hill and fell headlong, striking hard on her abdomen. She helped herself up and walked a quarter of a mile or more to school but complained of the pain in the abdomen. She was able to walk home, a half a mile or more, which she did soon after reaching the schoolhouse on the advice of the teacher. The child complained a great deal of pain and was restless the entire afternoon and night. The next morning the family physician was called to see her. He did not observe any swelling in the abdomen, but the whole abdomen was tender to touch and he feared that the child would develop peritonitis.

In the afternoon of that day the pain was localized in the right side, and especially to the back, over the region of the kidney, and there was some swelling in that region. The child grew gradually worse from this on, and the swelling increased gradually until the time of her admission into the hospital, at which time the swelling made an enlargement larger than the child's head. The swelling extended from the ribs down to the pubic bone, and was confined to the patient's right half of the abdomen. The patient was unable to stand or walk and was unable to straighten out the right leg and suffered great pain. The respiration was rapid and the pulse rapid and feeble. The child was pale, but there was no rise of temperature.

Her condition was so desperate that an immediate consultation was called. Dr. E. W. Walker saw her with me and it was agreed to aspirate at once for temporary relief, which was done, and six pints of straw-colored fluid, resembling urine, were withdrawn and the tumor disappeared. This fluid proved to be urine. The sac rapidly filled up, and in four days it was as large as before or even larger, at which time the child was given an anæsthetic and an incision made over the loin, just as one would make in extirpation of the kidney. This was made with the object of establishing free drainage or a more radical operation, if that were found

necessary. After cutting down through the muscles and fat we found postperitoneal a large accumulation of urine. The kidney was in the normal position and was normal in appearance.

The operation was completed by placing a drainage tube for free drainage so the child might recover from her serious illness and later do what surgery that might be necessary for her relief. Just what injury to the pelvis of the kidney or ureter had been sustained we could not determine at the time of the operation. The child's condition improved very rapidly, the greater part if not all the urine from that kidney coming through the drainage tube during her stay in the hospital.

She left the hospital convalescent, on December 24th, eleven days after the operation with the sinus still discharging urine freely and her general health improving. Urine continued to discharge through the drainage tube until January 10th, when it closed permanently and has remained closed since. She is a very strong and vigorous young woman sixteen years of age and a recent letter from her father dated November 29, 1905, informs me that she is as healthy a girl as there is in their city.

Case II.—A., male, aged seventeen years, a very tall and slender youth, weight about one hundred and fifteen pounds. He had never enjoyed robust health, having complained at times for three or four years from a pain located somewhere in his right side. It was in the region of the McBurney point, extending up toward his right kidney or down into his pelvis. These attacks of pain lasted at varying intervals from a few hours' duration to a half a day or longer, and the pain was always confined to the right half of his abdomen. They were regarded as mild attacks of appendicitis, yet a positive diagnosis as to the cause of the pain had never been determined by his physician. He had been under the care of the family physician a number

of times for these attacks and the boy was considered to be a semi-invalid, yet, when he was not suffering from the pain he engaged in ordinary sports of the school-boy with his friends.

On September 10, 1902, while playing a game of ball, he attempted to throw the ball a long distance, and the muscular effort caused him great pain in the abdomen. As he expressed it he felt something give away or tear in the abdomen. He was unable to stand on his feet, was very pale, and it so alarmed the boys who were playing with him that they secured an express wagon and hauled him home, a distance of a half mile or more, where the family physician, Dr. Wells, of Vanceburg, Ky., saw him soon after. The boy had not yet rallied from the shock and was suffering great pain. The doctor administered for his relief and was yet undecided as to a diagnosis. The boy was unable to leave the room for many months after this injury. His condition did not improve and a fulness appeared in the right half of the abdomen, and on November 1st, Dr. A. G. Sellards, of Portsmouth, Ohio, was called in consultation. At that time there was a fulness in the right half of his abdomen, apparently larger than a cocoanut, extending from the anterior superior spine of the ilium upward. The boy suffered a great deal of pain, his temperature and pulse were practically normal, and the case was a very puzzling one to the physicians. From this on he grew worse rapidly until on November 27th I was asked to see him at his home in Vanceburg, Ky. He was greatly emaciated, with a rapid pulse and a temperature of 100. He was unable to lie in any position except upon his right side, with the limbs flexed. The abdomen was enormously distended, especially over the right half. His skin was moist, his tongue dry and red, his respirations rapid, and his appearance was that of nearing dissolution. The abdomen was most peculiar in contour. I had never seen anything like it in appearance.

In the region of the McBurney point the abdominal wall was protruding like a cocked hat.

There was dulness over the whole tumor region, backward to the spine, as well as two inches past the middle line to his left, and the dulness extended down to the pubic arch. The abdominal wall was very thin. Fluctuation could be elicited at every point over the tumor. A diagnosis of appendicitis had been made long before this time and the condition was regarded by his physician as an appendicular abscess of an enormous size. The boy's condition was so desperate that it appeared as if he might die at any time. His condition called for immediate relief and it was decided to place a drain with as little injury as possible under ether anæsthesia. A short incision was made over the most prominent area, which was a little externally to McBurney's point. More than two gallons of fluid were evacuated without opening the peritoneal cavity. This fluid was not pus nor had it the appearance of pus, but had the appearance of stale urine, which, in fact, it was. A rubber drainage tube was placed without any effort being made to locate the cause of the leakage. The boy's condition would not permit of any prolonged manipulation or operation. The removal of the fluid relieved the embarrassed respiration greatly and his condition at once became improved. Within twenty-four hours the drainage tube was misplaced, and there was rapid accumulation of fluid. On December 2d, five days after the operation, I saw him again. He was yet very desperately ill. There was a large accumulation of fluid in the region of his right kidney extending down into the abdomen. As the previous operation had demonstrated the true cause of the enlargement, I advised placing a drainage tube in the back for constant drainage, but his condition was so desperate the family objected to any further operation at present. We compromised on removing the fluid by aspiration and removed

five pints of urine. His condition improved more rapidly now and I still urged by letter that he have a drainage established in the back, but the family insisted on trying aspiration as long as he continued to improve and have a drainage placed when they must.

The family physician, Dr. Wells, aspirated him again on December 10th, which was the second aspiration. The operation was performed again for the third time on December 20th, and again for the fourth and last time about January 5, 1903, removing several pints each time. There was never any pus in the fluid withdrawn. By January 5th the boy was able to sit up part of the time and improved rapidly from this on, and was discharged well about March 1, 1903, and has remained well up to the present time. There was never any blood or pus in the urine during his illness. The doctor had examined the urine frequently during the attacks before this for blood and pus, and had never discovered any.

In considering these cases one must be impressed with great tolerance of the patient of enormous postperitoneal accumulation of urine, without causing abscesses or infection. In reviewing the history of the first case, I am inclined to believe that there was a free rent either in the pelvis of the kidney or in the ureter. Within a comparatively short time, forty-eight hours, there was such an extravasation of urine that there was a well-defined tumor as large as a cocoanut in the region of the kidney. This enlargement would naturally displace the ureter and peritoneum obstructing mechanically the passage of urine through the ureter. The kidney must continue to secrete urine, and this added to the size of the extravasation until her condition became desperate. After evacuating with the aspirator, it readily accumulated so that at the end of forty-eight hours there was a tumor as large as a quart cup, while from the bladder the patient did not pass but little more than that

amount of urine, showing that but little if any urine passed from the affected side into the bladder. After a drainage tube was placed and the urine collected from the injured side there was about as much urine discharged from this side as from the bladder, and this continued to remain so for more than ten days, after which time the urine began to pass through the ureter, at times into the bladder. By placing a drainage tube and allowing the urine to escape so that the ureter would not be displaced, thus giving nature an opportunity to repair the injury, which it did, the urine passed the normal way to the bladder, and the patient rapidly recovered.

In reviewing the history of Case II., one would be inclined to believe that there was a narrow opening either in the ureter or the pelvis of the kidney, leaking out urine very slowly at first, because the rupture evidently took place on September 10th. It was more than ten days later before enough urine was extravasated to make a palpable tumor so that it could be outlined, and on November 1st the tumor appeared to be not larger than the boy's head. From this on, assuming that the enlargement displaced the ureter and by this means obstructing the free passage of urine, a large part of the urine from that kidney was extravasated and the tumor rapidly increased in size until the time of my visit on November 27th, when the urine was evacuated. We must assume that some of the urine passed the normal way into the bladder from the affected side, because the accumulation was not rapid enough to justify the assumption that all the urine from one kidney was deposited post-peritoneal. Again, after each operation of aspiration he would pass more urine from the bladder in a given twenty-four hours than he did when there was a large accumulation. The fact that after his last aspiration on January 5, 1903, he secreted and passed the normal amount of urine from the bladder without an accumulation post-

peritoneally, demonstrates the power of nature to repair these injuries.

I am convinced from the experience in Case I. that if the family had permitted the placing of the drainage tube in the loin and established a constant drain his recovery would have been more rapid, because there would have been no interruption of nature's effort at repair, as there must have been by the large postperitoneal accumulation of urine. From the clinical history in this case, one is strongly inclined to believe that the boy was a subject of a calculus either in the pelvis of the kidney or in the ureter, and that his great muscular exertion while throwing the ball caused the rupture. We judge this from his clinical history of the frequent attacks of pain extending over a long period of time. If this were true, what became of the stone is a problem unsolved and is purely speculative. It matters not what the cause of the pain was causing his long years of invalidism, it has since disappeared and he is now a perfectly strong and vigorous young man.

DISCUSSION ON THE PAPERS OF DRS. HUNNER AND HALL.

Dr. Joseph Ransohoff, of Cincinnati, in connection with these papers, showed a fixed stone in the kidney against the pelvic brim; also a large stone in the ureter. He exhibited one other stone which he removed from the ureter. There was a gutter in the stone through which urine drained without any damage to the kidney.

He asked Dr. Kelly whether he could always detect a very small stone in the kidney with the wax-tipped bougie.

Dr. Howard A. Kelly, of Baltimore.—I am glad to speak of the use of the catheter in the diagnosis of stone. Someone asked me before I came into the hall whether I had given up the wax-tipped catheter, and I replied that I find it more increasingly useful. For a short period, after the *x*-ray came into general use, I thought that there would be no further use for

the wax-tipped catheter; but the event proves that it has been by no means supplanted, for in some cases we are enabled to detect stones with it where the *x*-ray fails, and it is always valuable as confirmatory evidence.

Let me emphasize one or two matters of which Dr. Hunner spoke concerning the neglect of the usual means of diagnosis which have long been in vogue, and with which you are all familiar. In the first place, the question arises: Is there a stone in the kidney? Is the disease in the kidney? There are four groups of troubles in the right side that are being constantly mistaken for one another and for other diseases—ovarian, appendicular, renal, and gall-bladder. I have known cases in which women have had the right ovary removed when the disease was located in the kidney. Others after having the appendix removed still continued to suffer, and then it was shown that the trouble was in the kidney. My experience proves that in a great many cases women are consulting doctors about vague pains in the side which practitioners seem unable to differentiate, and after they treat them unsuccessfully for some time they put them all down to "nervousness," or rashly suggest the removal of the appendix or an ovary. I have seen several patients in whom the appendix has been removed, and others whose ovaries have been removed, and still others where an operation has been done on the gall-bladder, with little or no relief of suffering, when by introducing the catheter, with the patient in the knee-breast position, up into the pelvis of the kidney and forcibly throwing in fluid sufficient to distend the pelvis I have brought on a mild or severe attack of renal colic and the patient has said "That is the pain." The operator must not inject too hard or too much, for one patient whom I injected in this way suffered so intensely that I had to bring her back to my private hospital. Probably in nine cases out of ten these vague pains in the side can be traced to the kidney. If a patient has a renal calculus and the pain associated with it is not so pronounced as to make it perfectly evident where the seat of the trouble lies we can always locate the trouble with precision in the kidney by injecting the kidney as described, after which the appendix and other pelvic structures can be left out of consideration.

I recall one case in which I thought I had made a mistake. I

felt sure that the patient had gallstones, but in injecting the kidney I brought on the pain, and yet felt so sure that I was right in my diagnosis as to the gall-bladder being the seat of the trouble, from the superficial position and characteristic shape of the organ, that I cut down anteriorly and removed a number of gallstones. I found, however, that the kidney was *in descensus*, fixed in inflammatory tissue, and firmly adherent to the gall-bladder. The catheter was right, and I was right too. Sometimes kidney pains do not appear in the back, but in the groin or down in the hip; but the injection serves just as well here too. In a very few cases where the wax-tip is tried do we fail to find stone when there is one. The method is as follows: You take a catheter, two millimetres in diameter, with not too sharp a point, and dip it into a mixture of dental wax two parts, and olive oil one part; this on cooling forms a little highly polished ball near one point. It does not form on the very tip as a rule, but coats the catheter near the end. The catheter thus prepared is now passed up into the kidney, which is injected; you then instruct the patient, who has been in the knee-chest posture, to kneel in the erect position, then you separate the labia slowly, draw out the catheter, and note the characteristic marks. Once seen, you will be convinced there is nothing in your technique or in the body which can produce similar marks. The catheter must have come in contact with a hard body.

I had a case a few days ago, in which the *x*-ray showed nothing, but I passed the catheter three times and got scratch marks one each occasion. I remarked to my *x*-ray friend, that he had missed his chance and the interesting question then was which of us would turn out to be right. The marks each time were about the same, and the similarity showed that the markings were made by the same stone. When the stone is in the ureter, if you will put some of the wax farther down on the catheter, at two or three points, or coat the catheter all over with wax, you will get a long scratch-mark, and by measuring from the outer end of the catheter to the end of the scratch you will determine the point at which the stone is to be found. I did this the other day, and it saved me from cutting into a kidney for a stone. The reason my friend did not find the stone was because it was so small, not as big as a split pea; it was also very jagged, and lodged in a little diverticulum in the lower end

of the ureter. I could only get it out when I manipulated it bimanually with one finger in the vagina.

The scratch-mark method has proved invaluable in ureteral calculi, as it never fails if there. Sometimes we have a phlebolith in the pelvis looking like a ureteral stone. Dr. Leonard found such a calculus on the left side in one of my cases. I had passed a bougie and got no scratch-marks, and it proved to be a phlebolith in the line of the ureter.

I have used Hurry Fenwick's shadowgraph catheters with great satisfaction in locating a series of phleboliths, and I believe they are destined to be of great service; it does away with the stylet in the catheter.

In conclusion, I would say that this method is satisfactory because it is simple. Anyone can command the materials, and anyone who can pass a catheter can employ the method. There is no difficulty about it. The wax-tipped bougie is always harmless and ready for immediate use, while the *x*-ray is not always free from danger. We may succeed sometimes with the wax-tipped bougie or catheter where the *x*-ray fails. If we put the wax-tip on every catheter we can make the following determinations in catheterizing the kidney. In the first place, we locate the side and site of the disease by injection to cause pain. The wax which coats the end of the catheter locates a stone; we can measure by the amount of fluid received and discharged the size of the renal pelvis, and so tell whether we have hydronephrosis to deal with or not and its exact grade. We also draw off fluid from the kidney for chemical and bacteriological study. I have a patient in my private hospital now, upon whom I expect to operate this week, whose renal pelvis measures 60 c.c. on one side, and on the other 29 c.c. I cannot feel anything on the left side and I could not be sure what I am dealing with on the right side without having injected the kidney, drawn off the fluid, and measured the capacity of the pelvis.

Dr. Joseph Ransohoff, of Cincinnati.—It is with the greatest reluctance I am going to say what I am going to say after the interesting remarks made by my friend, Dr. Kelly.

In kidney surgery, where stone is suspected, ureteral catheterization has no place. I think it is the very last thing that one ought to resort to in making a diagnosis of stone in the kidney.

Furthermore, I believe the *x*-ray is one of the last things one ought to use in makng a diagnosis of stone in the kidney. We must not only consider the patient, but the training of the physician himself. With the methods that make for great accuracy, methods that are quickly used, we are very apt to interfere with our reasoning powers and discriminating powers, as well as our diagnostic skill, as surgeons and physicians. Therefore, in every case, unless it be emergency, in which I think there is kidney stone I try to exhaust every method I can by watching the patient for a week or even a month, watching the urine week after week and day after day; also the temperature chart day after day, in order to come to a conclusion as to the existence of a stone before I resort to the *x*-ray or to anything that is so hazardous in the hands of most people, as is ureteral catheterization. It is my view that ureteral catheterization has no place in ordinary examinations for stone in the kidney, and I think only in exceptional cases should it be resorted to.

With regard to the wax-tipped bougie, I cannot question the results Dr. Kelly has obtained. I have seen and am familiar with his admirable work in this regard, yet I am prompted to ask the question: Is this wax-tipped bougie more sensitive than my index finger? We know that a search is sometimes made for ten minutes or more for a stone somewhere in the kidney which only weighs perhaps six grains. Anyone who knows much about the position of stone in the kidney will recognize the fact that it must be exceedingly fortuitous if a wax-tipped bougie should happen to strike the stone in the kidney. In the ureter it is a different thing. With the wax-tipped bougie, where a stone is located in the lower pole of the kidney, how on earth can it come in contact with that stone? With a ureteral calculus it is all right, but with stone in the kidney, I cannot see how you can find it with a wax-tipped bougie unless it is a large stone in the pelvis of the kidney.

With regard to the injection of the pelvis of the kidney and the examination of the secretion, I do not know whether Dr. Kelly made a lapsus linguæ or not; but certainly, if I understood him, urine coming away contains blood cells. One of the most marked features in cases of stone in the kidney from urinalysis is the presence of a microscopic hæmaturia. I base my diagnosis very largely upon a continuous hæmaturia, recognized with diffi-

culty, but if you look for the pale, yellow shadows in the urine you will find them. How can one tell whether the blood he gets from the introduction of the ureteral catheter comes from the stone or is the result of catheterization? Bierhoff, a number of years ago, called attention to the same thing. He produced hæmaturia by distending the pelvis of the kidney, injecting, I think, a weak solution of boracic acid into it. I wish to insist that we should for our own benefit make a thorough analysis of the symptoms in these cases before we resort to any such measure as catheterization, if we are justified in doing it, and the *x*-ray.

With regard to the *x*-ray, the more I see of it in stone work the better I like it. About two years ago I made a diagnosis of stone in the kidney of a man who had typical attacks of renal colic. He had one *x*-ray picture taken in Philadelphia, and I understand that *x*-ray picture was pronounced negative. A single negative picture is worth nothing more than a single positive picture. If one takes six pictures, and they are poor, and should get in the poor picture two or three sharp shadows, in the same place, of the same size and shape, you can count on it you have the other symptoms; you have stone in the kidney. The *x*-ray picture, without a thorough analysis of the urine and clinical symptoms, you cannot rely on as a diagnosis of stone. A great many disappointments have arisen on account of the finding of stones in skiagraphs, and not finding them at the operation. One of the prettiest *x*-ray plates I have ever seen was that showing the piece of a needle in the head of a tibia of a child. The picture was so fine that I could see the eye of the needle in it. I cut down and failed to find the needle, notwithstanding the fact that we had two exposures. And so it is with regared to *x*-ray pictures of kidneys which show positively that there is a stone, and if you do not find a stone, it does not prove that the *x*-ray lies, but it simply proves you did not find the stones. If you study the pictures and study the symptoms carefully you will not go astray often. I am familiar with the magnificent results of Kummel obtained in the Eppendorf, at Hamburg, in which he never fails to find a stone in which a positive diagnosis of stone in the kidney has been made. And that has been my experience in recent years.

Dr. Hugh H. Young, of Baltimore.—As I do not deal with the ureters and kidneys of females, I cannot give any per-

sonal experience in reference to the use of the wax-tipped bougie, because with the ordinary male catheterizing cystoscope it is impossible to use the wax-tipped bougie, since many scratches would be made by the cystoscope itself. I have had an opportunity of seeing several other cases of Dr. Kelly and Dr. Hunner in which scratches were made on waxed bougies and there was no doubt in my mind as to their pressure.

In regard to finding stones in the ureter, it is evident they must almost always find them by this means.

With regard to the kidney, the proof of the pudding is in the eating. If Dr. Kelly and Dr. Hunner can furnish a series of cases in which they have found scratches, and found stones, and a series of cases in which they did not find scratches and did not find stones, it effectually answers the contention of Dr. Ransohoff. We cannot by theorizing disprove the practical work that has been done for years by men who are most enthusiastic on the subject. Theories, rhetoric, and psychology do not settle practical questions of the nature of those under discussion. On the other hand, we all know that the ureter itself generally enters the lower pole of the pelvis. We also know from our pathological studies that when there is a single stone present it generally lies at the bottom of the pelvis where the wax-tipped catheter will strike it. There are a few instances where the calculus is embedded in the calix distant from the pelvis, which would be impossible to locate by the wax-tipped catheter; but, at the same time, I believe such cases are rare. But certainly I cannot theorize as to whether they find them or not. I have seen a number of their statistics which show that they do find them; but they do not claim that the method is infallible.

At best the diagnosis is not always a very simple matter. I recall one interesting case where both the ureteral catheter and the *x*-ray led me to a false conclusion. The patient had pain referable to the right side. An *x*-ray picture was taken. It showed a large shadow on the right side, and what seemed to be a normal kidney on the left side. I catheterized the ureters. From the right ureter I obtained purulent urine; from the other ureter normal urine. I told Dr. Finney that my findings confirmed the *x*-ray diagnosis of stone on the right side. He operated and removed several large calculi; but the patient died from uræmia three days after the operation. At autopsy, the first thing they

found on the left side was a pyonephrosis. When the kidney was dissected out a double kidney was found on this side, with two ureters which joined at the level of the iliac, crossing the upper ureter, was plugged with a large stone which was so high up that the *x*-ray plate did not get it. I had catheterized the lower branch, and thus obtained the healthy urine which was produced by the healthy lower half of the left kidney. Had the *x*-ray plate been placed higher the calculus of the left kidney would have been discovered, but I see no way of preventing such a mistake with the ureteral catheter.

Dr. Charles P. Noble, of Philadelphia.—I would like to speak of one point, and that is with reference to the statement made by Dr. Ransohoff that several pictures are positive proof that there is or is not a stone. The case I have reference to is one which was reported by Edebohls, in which several pictures were taken by an expert, either in Syracuse or Rochester, New York. According to the pictures taken, there were said to be two or three stones apparently in one ureter. Later, the patient went to the other *x*-ray men, who got exactly the same results. Dr. Edebohls operated on the kidney, passed a ureteral catheter down the ureter, and found no stone in the ureter. At a subsequent cœliotomy he found two or three enlarged glands which he thought perhaps had given the pictures of stones in the ureter, and they were removed. After the man had recovered from the section he was *x*-rayed over again, and there were said to be three stones which occupied the same relation in the same ureter.

I think most of us are quite willing to use all measures at our command to make a diagnosis, as well as the *x*-ray and ureteral catheter. In my hands, the ureteral catheter has never given any trouble, and I regard it as one of the valuable aids to diagnosis.

Dr. Mack Rogers, of Birmingham.—I want to call attention to a report I presented at the last meeting of the Association on a case which closely simulated those reported, except in my case there was a cystic degenerated kidney. The patient was a young man, eighteen to twenty years of age, vigorous, who applied at my office for treatment. I made a kind of quibbling diagnosis of typhoid fever. He had a little temperature. I ordered him to bed, with the usual instructions. He continued to have this temperature for several days, and it stimulated the

typhoid fever type. He did not complain of trouble in the lumbar region during this time, but a few days later he did, and my attention not having been directed to it, I naturally did not observe any tumor or enlargement there. But just as soon as my attention was called to the fact that he had complained of uneasiness there, I made an examination and found some swelling there. I called a consultant. We agreed that he must have some trouble back there; that the temperature he had of low type must be due to some trouble in the loin. We opened up, and when we got through skin, muscular layer, and fascia out bulged this urine outside of the pelvis and outside of the ureter free in the cellular tissue beneath the fascia, demonstrating conclusively we had a leak somewhere. The question arose in our minds, Where is the leak, is it in the pelvis, in the ureter itself, or in the kidney? A little further dissection about the kidney demonstrated that cystic degeneration had occurred. It was a mere bladder, holding something like a pint and a half and the leak was from three small perforating ulcers through the walls of the kidney or cyst and not from either the pelvis or ureter. It took but a few moments to extricate it from the fatty capsule. We removed it *in toto*. The man recovered. We sometimes have perforation and infiltration of urine from a destroyed kidney and instead of the patient going along as these patients did without temperature, the patient runs a temperature, and it was the infiltration of urine that caused the temperature in this case.

Dr. Edward H. Ochsner, of Chicago.—About four years ago I had a rude awakening as to the inefficiency of the radiograph in cases of supposed kidney or ureteral stone and also as to the inaccuracy of the old statement that a colicky pain in the region of one of the kidneys followed by hæmaturia was a positive evidence of nephrolithiasis. The case I refer to was rather a peculiar and complicated one. A radiograph showed two stones in the left ureter. The patient gave a history of having had three different attacks of nephritic colic, each accompanied with pyrexia and followed by hæmaturia, and yet when we came to operate there was no stone to be found in the renal apparatus.

The patient in question was a well-known man, who had seen a number of our most prominent diagnosticians and came to us with the diagnosis of two stones in the left ureter, plainly

outlined on the radiograph, with the definite request to have them removed.

We made a median incision, so as to be better able to examine the abdominal contents and to get at the ureteral stone, which seemed to lie just in front of the left sacroiliac synchondrosis, and to our great surprise we found two concretions, each about the size of a lima bean, in the mesentery at the above point. We removed these, and on thorough search found a ruptured appendix containing an enterolith, all well protected by the omentum. The pain had been rather diffuse, not specially localized, and the radiograph with the hæmaturia had misled us.

Calcareous deposits in the mesentery are rather uncommon in man, but are very common in sheep, especially in sheep over two years of age. At about this time I had three cases in the course of two months, which had pain in the right lumbar region, simulating renal colic, followed by hæmaturia without kidney stone, but with acute perforative appendicitis.

All this goes to prove that one cannot blindly follow the old dogma; that severe colikcy pain, referred to one or the other lumbar regions, followed by hæmaturia, necessarily means a kidney lesion, without falling into a very serious error occasionally.

Dr. Hunner (closing).—I am grateful to the gentlemen for their free discussion of my paper. I purposely made it a general paper, in the effort to show that there are a great many difficulties attending the diagnosis of stone in the kidney, and that each of our methods is valuable, and that we should use all methods of precaution we can to arrive at a correct diagnosis.

I was rather frightened when Dr. Ransohoff got up and in a serious way condemned the wax-tipped bougie and the use of the *x*-ray, as well as the methods of precision in general; but as he proceeded I found that he thought a great deal of the *x*-ray because of the good results he had obtained with it in his work, and I am sure, if he would use the wax-tipped bougie, he would think a great deal of it also. Methods of precision tend to make us slovenly in our methods of reasoning and more common observation, but at the same time they should not do so. I prefer the use of the microscope and all the methods of precision I can command in kidney work in contrast to the ancients' method of testing the urine for a diagnosis.

As to the point made by Dr. Ransohoff, of his index finger

being more delicate in touch than the wax-tipped bougie, we are free to admit that the wax-tipped bougie does not reach all calix stones. On the other hand, I would rather go into a kidney with the preliminary scratch-marks, provided the kidney contains a small stone, because I would search longer to find the stone.

So far as hæmaturia and evidences of infection of the pelvis of the kidney are concerned, I think I emphasized the point. I am a strong believer in careful urinary examinations. In a paper read before this Association last year I pointed out the importance of making use of the microscope, and of securing as much evidence as possible from the findings in the urine. Let us make use of all possible means in making diagnoses, particularly the simpler ones, and we can then use the wax-tipped bougie and the *x*-ray to confirm or reject the decision we have come to.

LATE RESULTS OF THE TREATMENT OF INOPERABLE SARCOMA BY THE MIXED TOXINS OF ERYSIPELAS AND BACILLUS PRODIGIOSUS.[1]

By William B. Coley, M.D.,
New York.

ABSTRACT.

In September, 1891, in an article entitled "Contribution to the Knowledge of Sarcoma," published in the *Annals of Surgery,* I reported three cases of inoperable sarcoma treated by repeated injections of the streptococcus of erysipelas. In my study of the cases of sarcoma treated at the New York Hospital during the preceding fifteen years, I had found one case of very malignant round-celled sarcoma of the neck, four times recurrent, in which an attack of erysipelas had accidentally occurred shortly after the last operation by Dr. Bull. At this time the tumor so extensively involved the deeper tissues of the neck that no attempt was made to remove it. A few days after the first attack of erysipelas had subsided a second attack followed, lasting for a week. During these attacks of erysipelas the tumor of the neck entirely disappeared and the patient left the hospital in good health. After great efforts I finally succeeded in tracing the after-history of this patient and found him alive and well in 1891, seven years later.

At this time I had not read of the experiments of Fehleisen in inoculating malignant tumors with the streptococcus of erysipelas, but was sufficiently impressed by the foregoing case to undertake a series of investigations. It so happened that Dr. Wm. T. Bull then had a patient with inoperable, recurrent, spindle-celled sarcoma of the tonsil and glands of

[1] Paper published in full in Am. Journ. of Med. Sci. March, 1906.

the neck who was in such a hopeless condition that he was willing to try anything in the way of an experiment. Dr. Bull very kindly gave his endorsement. I worked for four months, during the summer of 1891, vainly attempting to produce erysipelas by inoculation. After trying cultures from three different laboratories I finally succeeded, however, with a culture kindly brought me by Dr. F. Ferguson from Koch's laboratory. The attack was very severe. I injected 7 minims of a fluid bouillon culture beneath the skin over the tumor of the neck. In one hour there was a severe chill lasting forty minutes, followed by nausea and vomiting; the temperature rose to 105° and in twelve hours there developed a typical attack of erysipelas which gradually spread over the entire face and head. The attack subsided in about ten days. The changes in the tumor were most striking. The tumor of the neck became paler and much softer and began to break down with a free discharge of caseous material on the second day; this continued for ten days. The outlying nodules disappeared without breaking down and the tonsil tumor decreased in size. At the end of two weeks the tumor of the neck had disappeared entirely. The patient's appetite returned and he gradually regained his lost weight, in fact, became perfectly well with exception of his previously contracted morphine habit. The tonsil tumor never disappeared, but remained as a hard, fibrous mass, apparently having lost its malignant character. The patient continued well for eight years, when there was a local recurrence which proved fatal not long after.

I have described this case somewhat fully, for upon it is based all of my subsequent work. Within the following year, with the valuable co-operation of Dr. Bull, I was able to treat nine other cases with the living cultures of erysipelas streptococcus.[1] There were no deaths in this series, although

[1] Three cases were treated in a special building erected for this purpose at the General Memorial Hospital and donated by Mr. Archer M Huntington.

I had two fatal cases not long after. All of these cases were, of course, inoperable and quite hopeless. There were six carcinoma and six sarcoma.[1] The results in brief were as follows:

In six cases I was unable to produce erysipelas, although frequent injections with fluid cultures were made for many weeks. In none of the cases of carcinoma was an actual attack of erysipelas produced, but in most cases there was slight improvement in the local condition while the patient was receiving these repeated injections with the fluid cultures. Of the six cases of sarcoma inoculation was successful in only four. In the cases in which it was impossible to produce an attack of erysipelas—same as in carcinoma—there was slight but always temporary improvement. Two of the cases were extensive bone sarcomas, one of the femur and one of the dorsal spine, both of very rapid growth.

Of the four cases in which inoculation was successful, and an attack of erysipelas ensued, one was the case already described, with sarcoma of the neck and tonsil, in which the patient remained well for eight years and then died of recurrence. Case II. was a very extensive, inoperable, mixed, round, oval, and spindle-celled sarcoma of the back and groin. This patient was inoculated on April 21, 1892. Repeated daily injections with the living cultures of the streptococcus of erysipelas obtained from the laboratory of the College of Physicians and Surgeons were given for three weeks, without producing an attack. In the beginning of the fourth week, injections of 20 minims of new cultures from Johns Hopkins Hospital were tried. After the second injection of 20 minims of bouillon culture there was a very severe chill, quickly followed by nausea, vomiting, and a temperature of 105.5. The attack lasted for ten days. The changes in the tumor in this case were even more striking than in the first. Within the first twenty-four hours of the attack the glossy, bright

[1] Published in the American Journal of the Medical Sciences, February, 1893.

red color of the tumor had become dull and lustreless and the tumor itself had shrunk considerably in size. On the second day a sinus formed, with free discharge of caseous, broken-down tumor tissue. A few days later the large solid tumor in the groin, the size of a goose egg, also softened and broke down the same way (the area of erysipelas had not extended into the region of the groin).

The discharge continued for two weeks, at the end of which time there was bright granulation tissue in the region of the sinus, which quickly healed. At the end of three weeks there was no trace of tumor remaining either in the back or groin. Part of the primary tumor of the back had been removed before treatment and examination by Dr. F. Ferguson, of the College of Physicians and Surgeons, and later by many other well-known pathologists, confirmed the diagnosis of mixed-celled sarcoma, the round cells predominating. Four weeks later the patient developed a localized abscess in the right pleural cavity, involving the lung, as shown by expectoration of a large amount of pus. An incision was made under cocaine and about a pint of pus evacuated and the sinus closed at the end of three weeks. The patient quickly regained his normal weight and strength. On July 1st, about three months later, there was a well-marked local recurrence in the back. On July 18th, several small nodules had appeared in an area of the back 2 x 4 inches. These grew rapidly. The injections of the fluid cultures were again begun and a tumor 7 x 8 inches in diameter disappeared under repeated injections *without* any attack of erysipelas. Repeated attempts were made to produce erysipelas, without success, until November 14th, at which time there was an area of tumors 5 x $3\frac{1}{2}$ inches and $\frac{1}{2}$ to $\frac{3}{4}$ inches thick. During these intervals the tumors would decrease in size and some of them disappear under injections of large doses of cultures, but would grow again more rapidly as soon as the injections were discontinued. On November 14th, an injection of 22 minims of a culture which had been frequently used before,

induced an attack of erysipelas followed by a temperature of 105 and lasting for a week. The same changes took place in this instance as have already been recorded after the first attack. The tumors again entirely disappeared, both in the back and groin. Three weeks later there was a second recurrence. During the following months three further attacks of erysipelas occurred spontaneously, although they were much milder in character than the two produced by inoculation.

Two very important facts were learned from the experience gained on basis of those ten cases, first, that it is extremely difficult to produce erysipelas at will, and second, that the curative properties of erysipelas are derived, in a measure at least, from the toxic principles of the streptococcus that might, hence, be utilized without an actual attack of erysipelas.

In addition to these facts, the danger of artificially produced erysipelas was strongly emphasized a short time afterward by two fatal cases. This, more than anything else, led me to attempt to utilize the toxins of streptococcus instead of the living germ. I began my experiments in 1892. At first I tried sterilization of fluid bouillon cultures by just sufficient heat to destroy the germs at 58° and also by filtering them through a porcelain filter. In December, 1892, I first used the erysipelas toxins prepared in this way in four cases of inoperable sarcoma, making the injections directly into the tumor and repeating same every forty-eight hours. The local and constitutional reaction was almost the same as in the case of a true erysipelas of mild degree the symptoms always subsiding in twenty-four to forty-eight hours. The temperature never rose above 103.5 and usually dropped to normal the following day. The filtered toxins were prepared for me by Dr. Alexander Lambert, of New York.

In order to intensify the action of the streptococcus of erysipelas I began at this time using the combined toxins of bacillus prodigiosus and streptococcus of erysipelas prepared for me

by Dr. B. H. Buxtom. The idea was obtained from Rogers' then recent experiments upon rabbits. Different preparations of the toxins were made; in some sterilization was done by filtration. The filtered toxins having been found to be very much weaker and the beneficial results apparently less marked than those obtained with the unfiltered product; they were soon given up.

The Action of the Toxins. In my earlier paper already cited (*American Journal of the Medical Sciences*, 1893) I ventured an explanation of the curative action of the toxins which seemed to my own mind the most satisfactory. It rested upon the assumption that cancer (in which term I include sarcoma and carcinoma) is due to an extrinsic cause, or causes, or the presence of some micro-organism. While during the twelve years that have passed, no definite facts have been brought forth to positively prove this assumpton, a much larger clinical knowledge of malignant tumors has served to convince me of the correctness of this theory. Most of the early objections to the parasitic origin of cancer have been answered by the discovery of new confirmatory facts. It has been proven to be more or less endemic. The researches of Guilliott have proven it to be mildly contagious in man. Recent observations have shown conclusively that it is certainly contagious in animals. We have recently proven that it can be easily transmitted from one animal to another by inoculations from the same species. The most significant fact is that successful inoculations of carcinoma have been made in mice with tumor tissue kept for long periods of time, in some instances (in Ehrlich's laboratory) for more than a year. It is hardly conceivable that a carcinoma cell even when kept at a very low temperature, should retain its vitality for such a period of time, while it is quite in harmony with our knowledge of serums that a micro-organism should be able to live under such conditions.

Assuming, then, for the moment that malignant tumors are of microparasitic origin, this is the explanation

I offered at the time. If a small quantity of blood serum of an animal rendered immune to tetanus is capable of destroying or rendering inert the virulent bacilli in a fresh case, it is quite as easy to understand that the toxic products of the erysipelas streptococci might bring about such changes in the blood serum as to destroy the parasite of cancer or inhibit the growth. The parasite having been destroyed the irritation would consequently cease, and this would lessen the hyperæmia or the parts upon which factor the life of the tumor cells of low vitality largely depends.

The question may very properly be asked, why it is that the results are so variable, that some cases yield such brilliant results while others are apparently but little benefited by the toxins.

My own explanation is that in all cases there is a certain balance of forces, the powerful proliferating tendency of the tumor cells on the one hand, the natural resisting power of the normal cells aided by the blood serum on the other. In certain cases, the toxins working through the blood serum may so increase its normal resisting or destructive properties that it more than counterbalances the proliferating forces of the tumor cells and then we have retrograde changes, often ending in permanent cures. In certain other cases this action may only equal the latter, and then we have for a time cessation of growth or a state of equilibrium until at length the one side or the other gains the ascendancy. Finally, in other and unfortunately the majority of cases the action of the toxins is never equal to the task, and while retardation of growth may occur, the tumor continues its course and eventually destroys life.

The same problem confronts us in explaining the action of the *x*-rays upon cancer. In some cases, the superficial epithelial growths, the tumor cells are destroyed, while in others there is little or no effect.

There are doubtless certain stages in the life history of every malignant tumor where the balance of forces is more

or less equal, and at these periods the toxins are far more likely to be successful than at other stages.

Again, the results vary necessarily greatly with the preparation of the toxins used. While the method of preparing the latter as described is comparatively simple, many of the preparations that have been put upon the market have been so weak as to produce scarcely any reaction and, hence, proved to be of little value. The preparation that I have used the last twelve years in nearly all of my cases was that made by Dr. B. H. Buxton, professor of experimental pathology of Cornell Medical School, and whatever successes I have had with the toxins are largely due to his bacteriological skill and hearty co-operation. The earlier successful cases were treated with the toxins made from the cultures of erysipelas obtained from a fatal case, and in the later cases the virulence of the cultures was kept very high by frequently passing the streptococcus through a series of animals.

Parke, Davis & Co., of Detroit, Michigan, have made great efforts to improve their preparation and bring it up to the standard obtained by Dr. Buxton, and during the last year they have come very near to it. For a long time the Parke, Davis & Co. preparation failed to show the deep red color characteristic of the bacillus prodigiosus, and from long experience I have found the colorless toxins to be much less efficacious in producing an effect upon sarcoma. The reactions were likewise much less marked. Hence, I have come to regard the red color of the toxins as an important sign of their value. The reason for this has been lately shown by Dr. S. P. Beebe, who is making a series of experiments in connection with the Huntington Cancer Research Fund at the Loomis Laboratory, with various preparations of the toxins and their effect upon animals in general and upon sarcoma in dogs.

He has found that the bacillus prodigiosus grown in a deep flask, with little surface exposed to light and air, show little or almost no color, whereas, when the cultures are grown in

shallow vessels, with large areas exposed to light and air, the deep red color appears very soon. He has further demonstrated the fact that these red cultures develop much more powerful toxins.

Directions for the Preparation of the Mixed Toxins of the Streptococcus of Erysipelas and Bacillus Prodigiosus, According to the Formula of Dr. B. H. Buxton.

Broth. One pound of minced beef soaked overnight, in 1000 c.c. of tap-water, then boiled for one hour, filtered through flannel; add peptone (Witte's), 10 grams. NaCl, 5 grams. Test reaction to litmus and render alkaline by addition of sufficient quantity of 10 per cent. NaOH; boil for one hour; sterilize by boiling half hour on three successive days; 25 c.c. of broth in a small flask is sown with streptococcus from culture in broth (a few c.c. of such culture being used); allowed to grow in the incubator for three weeks; then sown with bacillus prodigiosus (agar or broth culture), and allowed to grow at room temperature in the daylight (not direct sun) for ten days more. Poured in sterile bottles, heated to 60° in water-bath for one hour and 4 to 5 c.c. of glycerin, and a small lump of thymol added. Kept on ice until used.

As to the part the bacillus prodigiosus plays in causing the disappearance of sarcoma, its value rests entirely upon experimental or clinical data. Yet the fact that all of my own successes as well as those of other surgeons have been obtained by the combined toxins, not a single permanently successful case having been observed from the use of the erysipelas toxins alone, goes far toward establishing the importance of the bacillus prodigiosus.

In earlier years I experimented upon a large number of cases of inoperable sarcoma, first with the erysipelas toxins alone and later with the erysipelas toxins combined with the prodigiosus, and I am quite convinced that the de-

structive effects of the erysipelas toxins were greatly increased by the prodigiosus toxins.

That this action is not merely a local action in the nature of an escharotic like carbolic acid, *e. g.*, is proven by the fact that in numerous instances the tumor has disappeared from injections made remote from the locality of the tumor, showing it must have been due to a systemic rather than local influence. In most cases the best and quickest results are obtained by local injections showing a probability of both a local and a systemic action. This action I believe to be in the nature of a coagulaton necrosis with a local leukocytosis. The tumor tissue at once becomes paler, loses its vascularity, undergoes fatty degeneration and subsequent absorption or breaking down. Which of these two results occurs is dependent upon the nature of the tumor and the general condition of the patient. As a rule, the spindle-celled sarcoma with fibrous tissues predominating are more likely to disappear by slow absorption without breaking down or sloughing; while the more highly vascular growths, the round-celled type, are more likely to degenerate rapidly with the formation of sloughs.

As to the dosage, technique of administration, and duration of treatment, the only rules we have are those based upon experience. As a result of the personal use of the toxins in every variety of cases of inoperable sarcoma, extending now over a period of thirteen years, I would offer the following brief suggestions:

1. Always begin with a minimum dose, for the reason that individual susceptibility varies much and the vascularity of tumors varies more. The more highly vascular the tumor the more severe the reaction.

2. For local injections the dose should be much smaller than for interstitial injections remote from the tumor. The initial dose for local injections (into the tumor) should be $\frac{1}{4}$–$\frac{1}{2}$ minim; for interstitial injections (remote from the tumor) 1 minim.

3. The dose should be gradually increased until a chill

occurs (one-half to two hours after injection) followed by a temperature of 101 to 103 or 104° F.

4. If there is much depression following the reaction and the patient's general condition is not very good, it is wiser to give the injections every other day, but if the patient can bear daily injections the chances of success are much greater.

5. In cases in which the tumor is situated in some region where injections are difficult or dangerous, *e. g.*, within the abdomen or pelvis, it is better to give systemic injections into the thighs, buttocks, or abdominal wall.

6. If the tumor becomes soft and fluctuating it is better to open the softened areas, establish drainage, and treat with moist antiseptics.

7. A good tonic, preferably strychnine, quinine, and iron, should be given during the treatment and careful attention should be paid to keeping the bowels free.

8. *Duration of Treatment.* In successful cases a marked improvement is usually noted within one to four weeks. If no improvement has occurred at the end of four weeks of vigorous treatment, the chances are that none will occur and little is to be hoped for more than a retardation of growth, and it may be wise to abandon the treatment or lessen the dose to the point of not making the patient uncomfortable by reason of chills. If, however, there is decided improvement, the injections should be continued until the tumor has totally or nearly disappeared. In some cases the treatment has been continued in small doses more than a year and the patients are now well, many years after the cessation of treatment. The average duration of the treatment in the successful cases has been about two or three months.

9. *Technique of Administration.* The toxins should be kept in a cool, dark place. Any good hypodermic syringe will answer, preferably one in which one minim can be accurately estimated on the piston rod rather than on the barrel of the syringe. I sterilize the needle by an alcohol flame and pass boiling water through the syringe before and after using.

In doses less than 1 mm. the toxins can be diluted with boiled water; in doses larger than 1 mm. no dilution is needed.

The skin over the area into which injection is to be made should be carefully cleansed with alcohol.

10. In cases in which the toxins are given after primary operation as a prophylactic against possible recurrence, smaller doses may be given and it is not advisable to push them to the point of producing a chill; a slight rise of temperature, headache, and malaise are sufficient.

That the long-continued use of the toxins is not productive of harm is proven by several cases in my own experience.

One patient with a twice recurrent, very rapidly growing carcinoma of the breast and axilla was given the toxins for two and one-half years. The tumor disappeared and the patient gained ten pounds in weight and remained well for over two years, when she developed general carcinosis with extensive abdominal involvement and died in a few months.

In another case, an eight times recurrent sarcoma (spindle-celled) of the chest wall (soft parts) the toxins were administered with occasional intervals of rest for nearly four years. The patient, a well-known physician, has had no treatment for over six years and has been able to attend to his large practice the entire time.

Indication for the Use of the Toxins. While the curative action of the toxins varies greatly in different varieties of sarcoma, being most marked in spindle-celled and least of all in melanotic sarcoma, I believe the toxins should be tried in practically every case of inoperable sarcoma, with the possible exception of cases with extensive generalization.

In melanotic sarcoma I have had no permanent success, but there are cases of this type of sarcoma that have been cured by accidental erysipelas and cases which remained well two years or more under the mixed toxin treatment. I believe a trial worth while in such cases.

That no case of spindle or round-celled sarcoma is too

desperate to warrant a trial of the method has been shown by numerous cases.

At the time of my earlier paper "The Treatment of Malignant Tumors by Repeated Inoculations of the Living Germ of Erysipelas" (*American Journal of the Medical Sciences*, May, 1893) I had collected thirty-eight cases of malignant disease in which an attack of erysipelas had occurred either by accident or design. The attack had occurred accidentally in twenty-three, and as a result of inoculation in fifteen. Seventeen cases were carcinoma, seventeen sarcoma, in four the type of growth was doubtful. The results of these cases were in brief as follows: of the seventeen cases of carcinoma three were permanently cured; in addition one, a probable carcinoma, was well five years after the attack of erysipelas; the remaining thirteen showed more or less temporary improvement.

Of the seventeen cases of sarcoma seven or 41 per cent. were well and free from recurrence from one to seven years after the attack.

The type of tumor in these seven successful cases is worthy of note: one was a round-celled sarcoma of the neck; one, an osteosarcoma of the femur, recurrent; a third, a round-celled sarcoma, involving mouth, face and orbit, in a child ten years of age. The condition in this case was so desperate that death from exhaustion was daily expected. The tumor disappeared within a few days during an attack of erysipelas and the child was quite well, without any trace of a return a year after. A fourth case was a spindle-celled sarcoma of the neck; another a melanotic sarcoma of the breast; another still was a multiple sarcoma of the face and the seventh was a lymphosarcoma of the neck.

In my own experience I have never seen a case of melanotic sarcoma or lymphosarcoma of the neck cured by operation.

The ten remaining cases showed more or less marked improvement. In some cases the tumor entirely disappeared and then recurred in the course of some months.

Since the time of publication of my paper just referred to, in 1893, I have endeavored to collect other cases in which erysipelas has occurred accidentally or otherwise in connection with malignant tumors. Although these cases are few in number, they confirm what has already been said.

These new cases are as follows:

Case I. (Reported by F. C. Boomer, of Chicago; personal communication.)—Cancer of the breast, covering an area of about sixty square inches; entered hospital to die; violent erysipelas infection. Tumor disappeared in the course of six weeks. No recurrence in nine years.

Case II. (Ibid.)—Sarcoma of the neck, the size of an orange; erysipelas inoculation; entire disappearance of tumor; patient alive and free from recurrence eight years later.

Case III. (Ibid.)—Cancer of the face that developed in the scar of an old burn; eighteen years' duration; erosion of lower eyelid and alar of nose; entire disappearance immediately following an attack of erysipelas, after the patient had been pronounced hopeless; recurred locally several years later; was then treated by the daily injections of the mixed toxins; a typical epitheliomatous ulcer, the size of a silver dollar, healed after one month's treatment; the treatment was continued for one month longer; patient discharged cured. Patient removed to Dakota, from where he wrote six months later that there was a local recurrence.

Case IV. (Dr. Copeland, Round Hill, N. J.)—Large epithelioma of face, cheek, lip and nose; patient aged eighty-five years. Entire disappearance under an accidental attack of erysipelas. Patient died of other trouble two years later, without recurrence.

Case V. (Dr. C. C. Brockman , Ottumwa, Iowa, 1890.)—Female, aged seventy-one years; typical epithelioma of the face of one to two years' duration, the size of a silver dime; ulcerated one year. Severe attack of erysipelas in the spring of 1897, with temperature of 104° to 105°. Ulcer entirely healed in two months. Patient well six months later.

Following are a few cases showing the value of erysipelas infection as a prophylactic agent:

Case I. (Dr. Boomer.)—Extensive cancer of both breasts; speedy recurrence anticipated; severe erysipelas infection during course of wound healing. Patient alive and well for seven years.

Case II. (Dr. Rudolph Matas.)—Epithelioma of the ear, involving parotid back of glands. Incision, but not regarded as complete and almost certain recurrence expected. Severe attack of erysipelas developed during wound healing. Patient alive and well four years later.

Metastases. When the sarcoma has become generalized, as shown by the presence of distinct metastases, the prognosis is naturally much more grave. At one time I was inclined to advise against the use of the toxins in such cases. Yet there have been a number of successful results in just such conditions, *e. g.*, the case of Battle, of London, the case of Dr. Winberg, and, especially, two of my own cases. In one, the case reported in my earlier papers, with sarcoma of the back with extensive metastases in the groin, the patient recovered and remained well for three and one-quarter years and afterward died of internal metastases. In the other case, a round-celled sarcoma of the femur, there was a very large metastatic tumor in the pectoral region and one, the size of a child's head, in the lumbar and iliac regions, which disappeared and the patient is alive and well more than three years afterward. The case of sarcoma of the spine reported in full (*vide* cases) with extensive emaciation and total paralysis of the lower extremities, bladder and rectum, with perfect recovery and the patient in perfect health four years later, proves that no case is so desperate as not to be worthy of a trial of the treatment.

I have called attention in other papers to the possible danger of producing metastases from the use of the *x*-rays in malignant tumors, especially sarcoma, and I have cited cases in my own experience in which very extensive metas-

tases seemed almost certainly produced by the too rapid breaking down of sarcoma of lymphatic glands under the *x*-rays and the infected cells entering the circulation and being carried to remote parts of the body. The most conclusive case of this kind was a very large lymphosarcoma of the neck. The tumor disappeared very rapidly under the influence of the *x*-rays, but soon recurred and the patient finally died with the most extensive generalization of the disease, that I have ever observed. Not only were there internal metastases, but hundreds of subcutaneous tumors varying in size from a pea to an English walnut, in every portion of the body from head to foot. The fact that in lymphosarcoma general metastasis is extremely rare, makes the case all the more significant. With the mixed toxins of erysipelas and bacillus prodigiosus we have more rapid degeneration and absorption of sarcoma than with the *x*-ray, and in a much larger number of cases, and at once the question arises, "Why does metastasis not occur in the same way?" I can only say, I have never seen any case which seemed to indicate such a result. The explanation may be offered that in the case of the toxins, certain changes in the blood serum have been brought about by the toxins which make it destructive to the tumor cells which have gained access to the circulation, making it impossible to set up new foci of disease where they happen to lodge. While in the case of the *x*-ray, the action is merely local and the infected cells when transferred to other locations of the body, find favorable conditions for growth. But whatever the explanation, the facts are as I have described, at least in my own observation.

The Value of the Toxins as a Prophylactic after Primary Operation for Sarcoma or Carcinoma.

Theoretically, it would seem only logical that an agent that has the power of destroying a large inoperable tumor would be more likely to destroy the few infected cells that

remain behind after primary operation and give rise to future recurrence, yet this is a question the final settlement of which will require many more cases than I have been able to gather, and observations extending over a much longer period of time. Still, in view of the fairly well demonstrated fact that an attack of erysipelas occurring during wound healing after operation for primary tumor, lessens the chances of recurrence, and, assuming that the curative value of the erysipelas lies chiefly, if not wholly in the toxins, the theoretical reasons for using the toxins after primary operation, seem well grounded. Up to the present time, I have not felt that the number of observations were sufficient to warrant me in advising such treatment as a routine measure, but I am gradually becoming convinced of the wisdom of so advising. I have used the toxins as a prophylactic after operation in the following cases:

Case I.—Mrs. C., mixed-celled sarcoma of the finger, removed under cocaine, without amputation, under the belief that the growth was benign. Diagnosis of sarcoma confirmed by Prof. W. H. Welch. Amputation considered, but toxins first tried as a prophylactic. Patient alive and well seven years later.

Case II.—Sarcoma of the deltoid region. Toxins given shortly after operation, when there was a suspicion of a recurrence. Suspicious thickening disappeared; patient well three years.

Case III.—Spindle-celled sarcoma of the hand and axilla, recurrent four times, always within a few months after each operation. Patient well when last heard from a year later.

Case IV.—Round-celled sarcoma of the gracilis muscle of thigh; toxins immediately after last two operations in large doses, in addition to *x*-ray; apparently no effect whatever in preventing a recurrence.

Case V.—Sarcoma of the thigh, recurrent in stump after amputation; removed as well as possible by operation;

toxins given later and continued for several weeks, did not prevent recurrence.

Case VI.—Sarcoma of the thigh muscles. Considered inoperable except by amputation. Toxins for three months; at first the tumor nearly disappeared; then gradually became beyond control. Hip-joint amputation with every expectation of quick recurrence as the disease extended nearly up to the flap. Toxins given; no recurrence; patient well six years afterward.

Case VII.—Double carcinoma of the breast, considered quite hopeless by Dr. Maurice H. Richardson, of Boston, in 1895. Recurrent mass on one side, four inches square, removed and toxins given immediately afterward; continued in small doses, with intervals of rest for several years. Patient from time to time had small subcutaneous nodules appear of very low type of malignancy. She lived for nearly ten years; then died of abdominal metastases.

Round-celled Sarcoma of the Testis. J. G., aged fifty-two years. Operation for round-celled sarcoma of the testis performed in 1901. Recurrence within one year. A second operation was done removing the other testis, after which the toxins were given as a prophylactic. The patient is doing well at present nearly two years later.

Carcinoma of the Breast, Three Times Recurrent. Mrs. B., aged forty years. The first operation was performed on January 19, 1894; the second by myself in June, 1895. It was impossible to remove all of the infected glands from the axilla. One gland, the size of a hickory nut, high up in the axilla and completely surrounding the axillary vein, had to be left behind. Local recurrence took place in the cicatrix before the wound had entirely healed, and progressed rapidly. The arm soon became swollen and the pectoral muscles showed marked infiltration. The patient was then put upon the mixed toxins, the injections being given two to three times a week. The treatment was continued with intervals of rest for nearly two years. At the end of six

months the mass in the axilla could no longer be felt. An area of local recurrence in the cicatrix was excised. The right arm which had been two inches larger than the left, was reduced so that its circumference was only one-half inch greater than that of the other. The patient remained well until the summer of 1897, two years, when the toxins, were left off for a period of five weeks. During this time the local tumor increased rapidly in size and evidence of extensive metastases in the liver and abdomen appeared. The patient died in December, 1897, two and one-half years later. Microscopic examination proved the tumor to be a typical carcinoma.

Final Results of Personal Cases. Of thirty-six cases which may be fairly classed as successful, in that the tumor disappeared under the injections with the mixed toxins, the type of the neoplasm was as follows: thirteen round-celled; sixteen spindle-celled; two mixed-celled; one epithelioma; one chondrosarcoma; three no microscopic examination made, but the clinical appearance, together with the history of recurrence, left practically no room for doubt as to the diagnosis.

The results in these cases thus far have been as follows: five, well less than a year; four, from one to two years; three, from two to three years; four, from three to five years; twenty, from five to thirteen years; ten cases well over ten years.

In five cases a recurrence took place and finally proved fatal. In one of these recurrent cases the patient remained well eight years; in one, three and one-quarter years; in one, two and one-half years; in one, seven months; in one, six months.

These five cases of recurrence are perhaps the most important of all, inasmuch as they furnish absolute proof of the correctness of the diagnosis, and refute the early objections brought against the method, that the successful cases were probably examples of errors in the diagnosis.

That in twenty-six (personal cases) the patients were alive and well from three to thirteen years after treatment would mean a good deal if we were dealing merely with primary operative sarcoma, but when we consider that all of these cases were beyond operation and were absolutely hopeless, as regards treatment of any kind, it means far more. Look for a moment at the results of operations for cancer of the stomach which are receiving such a large share of attention at present, and which are advocated more and more strongly each year. In one of the most recent and valuable books (*Abdominal Operations*, by Moynihan, 1905), the results at one of the leading surgical clinics of Europe, and one with perhaps the largest experience in stomach surgery, show that of two hundred and nine cases of cancer of the stomach operated upon only two cases were alive and well beyond three years.

The value of any method in the treatment of malignant tumors depends not upon the number of cases in which the tumors have disappeared, but upon the number of cases in which the patients are alive a sufficient number of years to warrant us in calling them cured, in other words, upon the test of time. An exhaustive study of the late results of 125 cases of primary sarcoma operated upon at the Presbyterian Hospital shows only thirty-two cases well at the end of three years; only eight at the end of ten years (*Annals of Surgery*, August, 1904). I have made great efforts to trace not only my own cases but also those successfully treated by other surgeons with the following results:

Final Results of the Treatment of Inoperable Sarcoma with the Mixed Toxins in the hands of other Surgeons.

From published reports and personal communications from other surgeons who have tried the mixed toxins in inoperable sarcoma, I have tabulated sixty cases of complete or partial success. Of these cases, twenty-two were sarcoma

of the round-celled variety; fourteen spindle-celled; three mixed-celled; three endothelioma; two epithelioma; in sixteen no microscopic examination was made, or it was not recorded, but in all of these cases the clinical diagnosis was confirmed by a number of surgeons and the patients were considered hopeless from an operative standpoint. The results in these cases were as follows: twelve remained well less than one year; in six the tumor disappeared and the patient was alive and well from 1 to 2 years; nine from 2 to 3 years; twelve from 3 to 5 years; nine from 5 to 11 years; five cases recurred within periods of from six months to two years, two died during the treatment; one, a case of A. Marmaduke Shield (*Brit. Med. Journ.*, January 23, 1897), a recurrent, inoperable round-celled sarcoma of the breast. The tumor disappeared by breaking down and sloughing, but the patient died of pyæmia, staphylococcus infection, while still under treatment; the second was a case of M. L. Harris, of Chicago (personal communication), a recurrent, inoperable sarcoma of the ovary involving the rectum. The toxins were used for four weeks, the injections being made into the arm. Very marked improvement was noted, the tumor decreased greatly in size, resulting in a final sloughing of the entire tumor. The patient died a month later of septic absorption.

This latter case is of great value as showing the systemic influence of the toxins.

Nine cases were alive and well without recurrence from five to eleven years.

In nine of my successful cases the sarcoma originated in the bone; in twenty-two in the soft parts (external); five were in intra-abdominal growths. In seven cases the injections were made remote from the tumor, usually into the tissues of the thighs or the abdominal wall, proving that the tumors in these cases disappeared entirely as a result of the systemic action of the toxins.

Of the successful cases in the hands of other surgeons,

twenty occurred in the bones; no less than nineteen were intra-abdominal growths; only fourteen occurred in the soft parts other than the abdomen. In twenty cases, the injections were made remote from the tumor into the tissues of the thigh or abdominal wall. In the remaining cases the injections were made locally into the tumor. The bone sarcomas were distributed as follows:

Three of the tibia, one of the fibula, four of the superior maxilla; three of the femur; one of the spine; two of the ribs; two of the radius; one of the humerus; one of the orbit; one of the lower jaw; one of the sternum.

The Use of the Toxins Before Resorting to Amputation in Cases of Sarcoma of the Extremities.

This is a very important question and one upon which I have avoided expressing a positive opinion until a sufficient number of facts have been collected to justify such an opinion. Up to the present time I have been able to collect twelve cases of sarcoma of the extremities, three personal cases, and nine reported by other observers, in which the use of the mixed toxins has rendered amputation unnecessary and the limb has been saved.

In eight of these cases the sarcoma was of the round-celled variety, in two of the spindle-celled, and in two no microscopic examination was made, but amputation had been strongly advised in both instances by a prominent surgeon.

The period of observation of these cases is most important: Eight were alive and well and free from recurrence from three to six years; two were well at the time of the last observation, at the end of one year; two other cases were observed less than six months.

In all these cases, with but one exception, the tumor was of bony origin: five of the tibia; one of the fibula; two of the femur; one of the forearm; one of the humerus; one of the thigh involving the periosteum; one of the calf of the leg.

In every one of these cases amputation had been seriously considered, but it seemed justifiable to give the toxins a trial before resorting to operation. These cases seem to me sufficient in number and the period of observation sufficiently long to justify us in advising preliminary toxin treatment in nearly all cases of sarcoma of the extremities before resorting to amputation.

DISCUSSION.

Dr. I. N. Stone, of Washington, D. C., was asked to open the discussion. He said: I would like very much if Dr. Coley would put the results of his work on the blackboard, so that we may see it, as well as the results of the other surgeons who have assisted him by reporting their cases. We think this proves the parasitic origin of sarcoma and cancer. Out of this work we are going to get great good. We have heard the excellent results that have been obtained by Dr. Coley, and we should carry them away from this meeting as an object-lesson.

Dr. Charles W. Oviatt, of Oshkosh.—I would like to ask Dr. Coley if he has known of other cases, aside from the one he mentioned, where the subject of sarcoma had been infected with erysipelas from the actual disease.

I ask this question because I saw a patient in the Presbyterian Hospital, Chicago, in the service of Dr. Senn, 1903, who came in with a fascial sarcoma between the scapulæ, and who became infected in the hospital with true erysipelas and got well. Following that, Dr. Senn followed up nine cases, with injections, as suggested by Dr. Coley, with no results. I would like to ask him if he believes that infection with true erysipelas would give better results than injections of the toxins.

Dr. George W. Crile, of Cleveland.—Dr. Coley's work has long interested me, and I have tested the toxins made by Buxton and by Parke, Davis & Co., but have not seen any benefit in either carcinoma or sarcoma. Of the latter a single instance became soft under the toxin treatment, but the patient died.

Dr. Horace J. Whitacre, of Cincinnati.—I should like to ask two or three questions. I have had a similar experience to that of Dr. Crile. I have used the mixed toxins a number of

times, and have been interested in this treatment from the start; but I have never obtained more than temporary arrest of the growth. I have two cases that have been under treatment for eight or nine months; the tumor has broken down several times, and while they are improving, the health is not good.

I would like to ask Dr. Coley whether it is not possible that the preparations we get will deteriorate with age? I should further like to ask him how many injections should be given per week. We have regularly aimed to get up a reaction of 102°, and perhaps in view of what Dr. Coley has said with reference to a reaction of 103° to 104° we have not given enough at each injection.

Dr. Coley (closing).—As to the relative value of the toxins and living germs I am unable to say, except judging from the cases that have been reported and the cases I have observed myself after injections. At the time I read my paper in 1893, I reported thirty-eight cases of malignant tumor with acute erysipelas, accidental, or by inoculation, and in order to answer one or two of the questions that have been answered, I will read that portion of my paper which I was unable to read, owing to ack of time. (Reading.)

In brief, seventeen cases of sarcoma showed forty per cent. free from recurrence from one to seven years. This is a larger percentage than we would expect from the use of the toxins. Yet a great many cases in which erysipleas occurred were probably not on record. It was only the more interesting cases in which recovery took place that were reported. Since 1893, I have been able to collect seven new cases that were sent to me by men throughout the country, in which some remarkable results were achieved from accidental erysipelas, some of the patients remaining well for six or eight years.

In reply to the question of Dr. Whitacre, there is a great deal in the technique. Many physicians are afraid to use the toxins to the utmost, to push them as far as I have gone in many cases, as shown by one case on which I treated for a recurrent spindle-celled sarcoma involving the parotid and neck. This patient was treated in Bridgeport, Conn., for several weeks and was then given up as a failure. The patient came to New York. He was a strong fellow, able to stand pushing of the injections to the utmost, which was done, until there was a reaction of 104° nearly every day, Sundays included, and that man recovered

entirely and has been well eight years. You must gauge your dose to the individual patient you are treating. The case I spoke of, of sarcoma of the spine, was very far gone, and I was not willing to push the injections to the extreme. The patient had a reaction temperature of 104° for weeks, and in spite of emaciation and weakness he was able to stand the injections and gained rapidly in weight during the time of treatment. One should begin by giving the injections in moderate doses and increasing slowly until there is a reaction of 101° to 103°. I have had cases of complete recovery with the temperature not going above 102°.

In regard to Dr. Crile's case, one of the cases I have reported in my paper was much similar. M. L. Harris, of Chicago, reported a case of round-celled sarcoma in the abdomen, which ended with complete sloughing of the tumor, causing peritonitis and death. Autopsy showed a big tumor which had almost degenerated under too rapid treatment. In cases of large soft sarcoma there is danger of too rapid breaking down of the tumor and sepsis following. The cases must be considered well in which the tumors have disappeared. In one case in which the examination was made by Dr. Whitney, there was a sarcoma involving the intestine, so that it caused a fecal fistula. The patient was put under treatment, and this round-celled sarcoma disappeared, although it involved the mesentery and a part of the bowel.

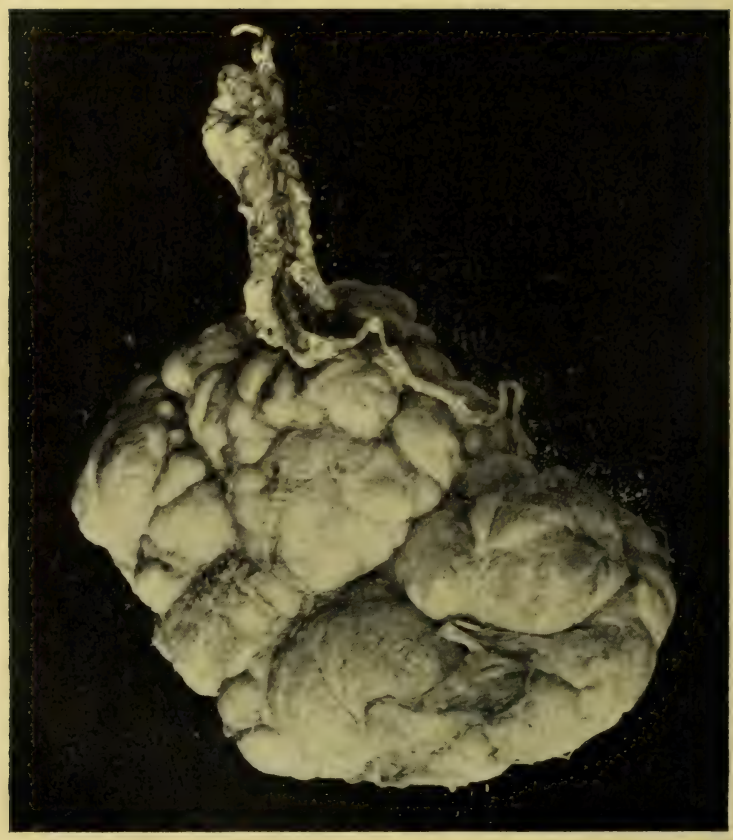
As to the preparation of toxins, in most of my early cases the toxins were prepared by Dr. B. H. Buxton and by Parke, Davis and Co. You must have a virulent culture. The recent preparation is very much improved and very nearly as good as Buxton's. I am greatly indebted to Dr. Buxton, Professor of Experimental Pathology in Cornell University, for his earnest assistance in improving the toxins.

Inoperable growths were rendered operable by the previous use of the toxins, and in some cases I think it wise to remove them, though in most cases they have gone on and disappeared. I have never advocated the mixed toxin method except in inoperable and hopeless cases and practically only in sarcoma. I have not used it except in experimental cases in carcinoma. In view of what we know about erysipelas toxins, I believe we get fewer cases of recurrence after their use after operation in primary sarcoma or carcinoma. As a prophylactic measure in these

cases we only need to use the toxins in small doses for a few months without laying up the patient or doing serious harm. There is no danger from the toxins when they are used carefully. There has been no death in nearly ten years from the use of these toxins, and when they are employed with the precautions I have laid down, there is no particular risk.

Dr. Rufus B. Hall.—If you were going to use the toxins as a prophylactic after operation, how frequently would you use them?

Dr. Coley.—This is an important question. It is not necessary to use them as often as in a case with a tumor present. I think three or four times a week enough, and with moderate doses, just enough to give a slight reaction.



GLIOMA OF THE BRAIN.

Dr. W. P. Carr, of Washington, D. C.—I thought this tumor was of sufficient interest to take a few minutes in talking about the case. This tumor was successfully removed from the brain of a man last Sunday. When I left Washington he was doing very well. When the tumor is examined microscopically I have no doubt it will be found to be a glioma. It is oval in shape. The outer end of it was just under the middle of the ascending frontal convolution, and the other end ran downward, inward, and a little forward. I could not tell exactly where it was attached. It had a pedicle with vessels in it. There was little hemorrhage from the removal of the tumor until the pedicle was torn loose, then there was severe bleeding, which was controlled by gauze packing.

The man first had symptoms two years ago. He was foreman on a bridge, and the architect had a good deal of trouble with him. He was a bad man; he was running after women all the time; he took women to the shacks around the bridge, where he was working. He was supposed to have syphilis. He was treated at the hospital by Dr. Vaughan, who gave him large does of iodide; afterward he went to Dr. Cushing, who gave him large doses of iodide. Dr. Cushing wrote to Dr. Hickling that he started to operate on him; made an osteoplastic flap five inches long and five inches wide, nearly half the size of the brain. It was necessary to make a big flap to remove a tumor like this. Unfortunately, he punctured some of the large sinuses, blood spurted, and patient collapsed for a time. He took the anæsthetic badly and the operation was abandoned. This was about three months ago. The symptoms came on gradually, paralysis which gradually increased in the right arm and leg, but more complete in the arm, and also had optic atrophy on the left side. All of the symptoms were pretty well marked. After the first operation the symptoms were relieved for a while. It relieved the tension; then they recurred, and he was almost completely

paralyzed in his right arm and right leg. After the second operation he had aphasia for a few hours; but within twenty-four hours he could talk pretty well again.

When this specimen was presented the patient was doing well and he continued to do well for two weeks. He had no fever, pulse normal, wound completely healed and was sitting up. He then became listless, lost appetite and strength rapidly and died on the twenty-second day after operation. Autopsy showed no cause of death. Brain wound perfectly healed and other organs healthy except a slight nephritis and slight tuberculous lesions of the lungs. (See photograph of tumor, natural size. It was two and five-eighths inches long, two inches wide, and one and three-quarter inches thick, and weighed one and seven-eighths ounces.)

LAMINECTOMY WITH REPORT OF A CASE.

By R. E. Fort, M.D.,
Nashville, Tenn.

Surgically speaking, three classes of spinal injuries are recognized.

1. Cases in which the cord is completely crushed.

2. Where there is doubt whether the cord is irremediably damaged.

3. Cases in which we have reason to assume that the cord is not irremediably damaged.

If it were possible to clinically isolate cases of the first class, namely, a crushed cord, they would be excluded as inoperable; but the number of cases presenting symptomatology of complete cord destruction, proven erroneous on the operating table and further verified by recovery, to my mind make these as imperatively surgical as the other two.

A case reported by Mixter[1] very well illustrates the impossibility of diagnosticating complete cord destruction without exploration. There was diaphragmatic breathing, complete motor and sensory paralysis below level of the lesion, and total absence of reflexes. The laminæ of the sixth and seventh vertebræ were found fractured and depressed, lying against the cord. The laminæ were removed, the dura opened, and no macroscopic lesion of the cord or clots were detected. Patient's condition progressively improved, and in three years was sufficiently recovered to earn a livelihood as an insurance agent.

Brewer[2] says that cases of hæmatomyelia recover without

operation, and cases of severe crushing injury do not recover with operation; and possibly some of the operative successes were unrecognized hæmatomyelia, in which recovery would have taken place independent of operation. Yet, he reports a case of injury of the last lumbar vertebra in which there was sensory paralysis, and complete loss of control of bladder and rectum, in which he performed laminectomy and found spiculæ of bone penetrating the cord. There was almost complete recovery within three months. Certainly this case would not have recovered without operation.

Kramer[3] reports a case of fracture and dislocation of the spine. Patient had complete paraplegia with absence of patella, plantar, and cremasteric reflexes. Laminectomy performed seventy-seven hours after injury found the arch of the twelfth dorsal vertebra pressing on the cord, with dislocation of twelfth vertebra forward. Patient gradually improved and is able to walk with assistance of cane.

Abbe[4] reports an interesting case of comminuted fracture of the fifth cervical vertebra. Operation six weeks after accident, under local anæsthesia of 15 drops of 2 per cent. solution of cocaine. In six months sensation was normal over entire body and voluntary motor power restored, except for the anterior tibial groups. He also reports complete recovery in a case where there was instantaneous and complete loss of motor and sensory phenomena below the injury, with absence of knee jerk.

I believe we are justified in accepting the statement of Walton[5] that "there are no symptoms that would lead one to assert that the cord was or was not crushed." Accepting this as a truth, and realizing the application of asepsis combined with the simplicity of the technique of laminectomy, I can see no other course to advise. It would not be amiss to state the value of laminectomy, or what we may expect to accomplish by it.

1. It removes depressed fragments of bone lying against the cord.

2. It removes spiculæ penetrating the cord.

3. It removes blood clots, both intradural and extradural.

4. It allows the escape of exudate, the pressure of which may cause cord degeneration.

5. Traumatic spinal œdema may be of such extent as to demand greater space for enlargement of the cord, so it will prevent further destruction of fibres.

One or many of these conditions may be present in every case in which we have depressed fracture. If they are not present the symptomatology would not be present, and each of these conditions demands immediate removal, thus giving the best guarantee against cord degeneration.

We can expect to accomplish nothing from tentative treatment, and irreparable damage may be produced by the persistence of any of the above conditions.

The rectification and fixation method of treatment formerly advocated by Burrell,[6] to use his expression, is a "hit-or-miss method at best," and to my mind is fraught with grave danger; and as I see it, its only field of usefulness is in fracture-dislocations, or in dislocations without fracture (a very rare condition), and under these conditions should be done after exploration and removal of the conditions which in the past have yielded us the fatal cases during operation.

The time of operation is another phase which should receive consideration. I recognize that some of the most successful laminectomies for depressed fractures have been late operations.

This is notably true of Horsley's[7] cases. Yet we may argue with propriety that the bad cases died, and it is fair to assume that had these been operated earlier some might have been saved.

Keen has shown that cord degeneration will occur in four days when subjected to pressure, and if the late operation is successful I believe it is fair to assume that early operation would have been quite or more successful, and

they would have been spared the grave hazard of degeneration.

I cannot believe that pressure on the cord should be allowed to exist longer than the general condition of the patient demands.

In a small percentage of spinal fractures, shock is so profound that the patient will not react. Of course intervention should not be attempted in these cases. Much shock is present in a large percentage of them and an operation should not be done until the patient has reacted. This amount of delay is not only justifiable, but imperative, even with the condition of pressure. The time required for reaction is not great, and operation in shock is here, as in other conditions, unjustifiable.

Another valid reason for this much delay is, we do have those cases of so-called spinal concussion. Here we have a certain amount of anæsthesia and paralysis. Operation in these cases would be unjustifiable, as they recover spontaneously.

I recall the case of a man who was in an elevator that fell four stories. He was brought to the hospital in a condition of profound shock. There was tenderness over the eleventh and twelfth dorsal vertebra, partial anæsthesia of lower extremities, retention of urine, but no motor paralysis. Recovery was complete within a week.

If operative procedure is more important in one class of depressed spinal fracture than another, it is those due to gunshot wounds.

This is true for the following reasons:

1. The great violence will produce more extensive injury.

2. The presence of the missile will of itself exaggerate the injury already done, and if it has lodged in the cord or spinal canal, will intensify the symptomatology and degeneration.

3. The liability of sepsis being carried with the missile, which if not removed, will produce death from infectious meningitis.

Prewitt[8] reports a case of complete paraplegia operation; showed the bullet had fractured and depressed the third cervical lamina and lodged in the canal. Fragments of bone were removed and bullet found with its points penetrating the dura. The patient recovered, and four years later showed only slight defect in movement of right arm.

He also presents records of forty-nine cases of gunshot injuries, collected during the aseptic era. Twenty-four cases were operated upon, with eleven recoveries and thirteen deaths. Twenty-five were not operated upon, with eight recoveries and seventeen deaths.

In the cervical region there was a mortality of 55 per cent., in the dorsal region mortality was 66 per cent. There were three operations in the lumbar region, all recovered.

The fact that the mortality is higher in the dorsal than in the cervical fractures is unusual. But the very nature of spinal injuries renders each case unique, so we have an unsafe guide in statistics, and I have purposely refrained from their use.

The hopes of the confirmatory value of the skiagraph have not been realized. They have proven deceptive. So the clinical symptoms alone must be relied upon.

Operation. The technique which I prefer will be described in report of the following case:

On June 14, 1905, patient, a young man, aged twenty-five years, became involved in difficulty when his assailant drew a 32 calibre revolver. Seeing his danger, he turned quickly so that he was so far as could be judged immediately in front of his assailant when he received the wound.

He fell and paralysis was immediate. The wound was at a point directly over the first dorsal vertebra. Patient was brought to the Infirmary twenty hours after injury, and in consultation with Drs. McCampbell and Paul Eve, the following conditions were found:

Motor paralysis complete from wound downward, sensory paralysis from umbilicus anteriorly, and wound posteriorly,

to knees. Hyperæsthesia of legs and feet, girdle pains, absence of patella reflexes and ankle clonus. Retention of urine and priapism.

Diagnosis. Gunshot wound of spine, with compression.

Operation. Patient placed on abdomen and after preparation, lumbar incision of five inches was made immediately to left of spinous processes. Using the first dorsal as a midpoint, the knife passing to one side of the spinous processes, down to the laminæ. The remaining muscular and ligamentous attachments were separated with periosteal elevator and scissors. Muscular hemorrhage was profuse but was completely controlled by strong retraction with Volkman's retractors.

Now it could be seen that the ball had fractured the spinous process of the first dorsal vertebra, and right lamina, driving fractured portions of the lamina into the spinal canal. The spinous process was completely separated from its ligamentous attachments, and removed with rongeur forceps. The fractured ends were now smoothed with lion-jawed forceps, the dura was well exposed. The bullet had split, leaving one-third within the spinal canal and the remaining two-thirds had penetrated the soft parts, ranging inward and to the right side.

The portion of the bullet in the spinal canal had penetrated the dura and a small portion of the right side of the cord. This portion of the bullet was removed, the dura and rest of the field of operation was cleansed with saline solution. The wound of the dura was left open. Some oozing persisted which was controlled with sterile gauze on each side, but not pressing on the cord. The rest of the wound closed with interrupted wormgut sutures. Patient put to bed in good condition. Voided three ounces of urine on June 16th, but did not regain complete control of bladder until June 19th. There was considerable escape of cerebrospinal fluid. Patient was very restless. Wound clean, no pus. On tenth day he developed temperature of 102.2°, pulse

120. Blood examination revealed malarial plasmodia. This yielded promptly to quinine. Motor senses of the lower extremities continued to improve, hyperæsthesia below knees continued, but less marked. By July 15th, hyperæsthesia had disappeared, except immediately below right knee. Patient was sent home July 31st, motor and sensory functions practically normal, but had not been allowed to walk. Patient has fully recovered, except some pain on the external aspect of right knee continues.

Operative points which will shorten and simplify laminectomy, are—

1. Straight incision of about six inches to one side of spinous processes.

2. Strong retraction with Volkman's retractors to control hemorrhage.

3. Sufficient separation of muscles and interspinous ligaments, for spacious operative field.

4. Complete separation of fragments of bone from all attachments, so further damage to cord will be avoided.

5. The dura should invariably be opened for two reasons: First, amount of intradural hemorrhage, amount of spinal œdema and amount of exudate cannot be estimated without opening it. Second, drainage should always be established in order that pressure from secondary effusion may be prevented.

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DISCUSSION.

Dr. Stuart McGuire, of Richmond.—In response to your call I will say that I did a laminectomy on a man some six months ago, but although the operation from a mechanical point was a success the patient was not relieved.

I wish to congratulate Dr. Fort on his excellent presentation of this subject. I regard his paper as one of the clearest on the subject I have ever read or heard.

Dr. J. Shelton Horsley, of Richmond.—I have been very much interested in the paper of Dr. Fort, and I congratulate him on the recovery of his case. I have had altogether eight cases of fracture-dislocation of the spine, and of these I operated on three. One case upon which I operated resulted quite successfully; the other two were not improved. One of them had pneumonia about a week after the operation, and died; the second case is still living a year after operation, but the condition is as bad as it was at first.

I want to call attention to one thing, and that is the different views that are held now with regard to repair of the spinal cord as compared with those that were held some time ago. Not long ago any lesion of the spinal cord was considered practically irreparable. It was said that there was no real repair at all. I do not think that view can be held satisfactorily now. The well-known case of Harte and Stewart, reported some time ago, in which the cord was completely severed in the upper part of the dorsal region, and after being sutured resulted in recovery with perfect motion and sensation, shows positively that the cord will repair.

As to the non-operative treatment there can be no question that a great many of these patients recover without operation. If a patient recovers without operation in this condition he will recover with operation. The operation itself is not as difficult as it is supposed to be, and unless there is infection there is no danger except from shock. With ordinary care, there is practically no danger from hemorrhage, and if a surgeon operates at the time when very little shock is present there will be no danger except from infection. If ten patients out of a hundred

will recover with expectant treatment with plaster casts and fifteen will recover with operation, it is our duty to give the patient the benefit of the extra 5 per cent. We operate on these patients with the understanding on their part that the chances are decidedly against benefiting them.

The time of operation is a point of a great deal of interest. These patients should not be operated on in the presence of shock. I do not think there can be any reasonable justification for it unless it can be ascertained that shock was caused by irritation of the cord by the fragments of bone. If there is hemorrhage going on and increased pressure taking place, operation should be done. There is a great difference in the reparative capacity of the upper part of the cord and the lower part. Repair of the lower part of the cord may be perfect but it is almost impossible to get repair of the cord in the cervical region that is at all satisfactory.

Dr. J. Wesley Long, of Greensboro.—In connection with Dr. Fort's paper, I would like to report a case illustrating the fact that even late in some cases much good may be done. The patient was a young farmer, who was injured while being in a stooping or squatting position under his reaper. The reaper fell and doubled him up like shutting a jack-knife. It caused a fracture-dislocation of the last dorsal and first two lumbar vertebræ. I saw him late and had no opportunity to operate upon him until one month after the injury. At the time I saw him he had complete paraplegia below the point of injury; he had a purulent cystitis resulting from the fact that the catheter had to be employed constantly; and he also had complete paralysis of the lower bowel. The man's condition was very deplorable. He became very much emaciated and it looked as though he would die. A longitudinal incision was made directly over the spinous processes. I found that there were three vertebræ dislocated and a fracture running through one of them—I think through the twelfth dorsal vertebra. I boldly removed all of the spinous processes that projected backward beyond the true line of the spinous processes, then did a laminectomy exposing the dura which was opened giving free access to the cord. I found no hemorrhage at this late day, but evidences of fibrinous deposits for some three or four inches along that portion of the cord where it had been pinched. After cleaning

the parts as well as I could and establishing drainage the wound was closed except at its lower end and the young man put back to bed. At first I noticed no improvement, but after a few days he expressed himself as feeling much better, and before he left the hospital, which was at the end of three weeks, he felt benefited and it was evident he had greatly improved. At the end of six weeks he was able to evacuate his bladder. At the end of two months he was able to evacuate his bowels naturally, and after a few weeks more he was able to move one of his limbs. He has not such good use of the other leg and foot but he is growing fat; the cystitis has disappeared; he is able to get out of bed and to go riding in a buggy.

I wish to congratulate Dr. Fort on his paper and I am glad to add this report to the discussion.

Dr. W. M. Perkins, of New Orleans.—I hope Dr. Fort or some other gentleman in discussing this subject will give me some information about two cases, and whether anything could have been done. One was a negro at the Charity Hospital, New Orleans, who suddenly dropped his head on the table and became unconscious. I was called; the resident student found the man with an irregular, bounding pulse, with Cheyne-Stokes respiration, and unconscious. I called the surgeon in charge of the ward; he looked at him and said it would be interesting to hold an autopsy in case of death. The man died, an autopsy was held, and we found a dislocation of the second cervical vertebra with some erosion of the first. The bones were slightly necrotic.

Some years later I was called suddenly to a house where they had been attending a patient for three or four days but had not made a diagnosis. It is with regard to this case that I would like criticism and light. The patient, a young woman, a week before while dancing had fallen suddenly with what appeared to be a fainting spell. She was brought home, put to bed, complained of pain in the back part of her head and was moderately hysterical. I saw her a number of times. I saw her in consultation and we arrived at the conclusion that she had overtaxed herself when she fell. She had nose-bleed and fainted. We found nothing except headache and pain across the back of the head. She never complained of anything in the neck. She was a small, dwarfish woman, very thin and perhaps pos-

sibly of a strumous family. She was finally better than she had been the last time I was called in. She took something, leaned over the edge of the bed to vomit, vomited once or twice, gave one scream and put her head back this way (illustrating). I found that she had an irregular respiration, irregular pulse. I caught her by the head, made forcible extension, and immediately respiration improved markedly. As long as I held her head, pulled it out from the trunk as it were, she breathed more easily. It was impossible apparently to do any good. I took hold of her head a second time, made extension for a while, and some personal friends were much upset by it. The question arises, Did I not make a mistake by not holding on to the patient's head and holding it tightly until some apparatus had been applied? The family were not disposed to let the thing go without an autopsy, because they wanted to know how she died. We opened the neck and found a fracture of the transverse process of the third cervical vertebra, with erosion of the second, third, and fourth, if I remember correctly. The lungs were not examined.

Here were two cases of what I believe to be dislocations of the vertebræ. I have no doubt that in the case of the young woman, when she fell the vertebræ were dislocated. I would like to have that case discussed particularly.

Dr. D. F. Talley, of Birmingham.—I enjoyed Dr. Fort's paper very much. Unfortunately, this is a subject which is not discussed much, because spinal surgery is not as brilliant and quick in its results as surgery in other parts of the body. Dr. Fort did not go far enough; he did not tell us after we get through operating on these cases how he carries out the after-treatment. He did not tell us how to manage the case afterward, and you know that the after-treatment is very long and very important. I agree with him in his ideas as to operative procedures in cases of fractures of the vertebræ, or of the laminæ, or of any portion of the spinal column, and I do not think we gain anything by waiting. As he has said, if the cord is subjected to pressure for a certain length of time, we have degeneration; we have an injury here which it may take a long time to repair, or it may never be repaired if pressure is allowed to remain on it too long.

I have had in the last six or eight weeks two occasions to do

laminectomy. The first case was one due to a gunshot wound. The wound was inflicted in the upper part of the sacral region, between the dorsal and lumbar plexuses. The anterior portion of the thigh had good sensation; but the leg and other portions supplied by the sacral plexus were practically paralyzed. In this there was immediate relief of the symptoms of paralysis the next day after laminectomy. In other cases where we have a fracture higher up in the lumbar region, as in a case I had last Sunday, upon which I operated, due to a very heavy weight coming on a man while he was in a stooping position, there was dislocation of one of the lower dorsal vertebræ, about the eleventh or twelfth. I found the laminæ on each side fractured, and also a fracture of the spine of the vertebra above; there was no pressure on the cord in this position, because nothing but the spine was broken. However, in the other there was marked deformity and marked pressure on the cord. I removed this and the cord appeared perfectly normal. There was no injury to the dura. There was no indication that there was an intradural hemorrhage, so I did not open the dura, and I do not see what advantage there is in opening the dura unless we have evidence of hemorrhage and have to remove an intradural clot. If you have the cord inside mashed or separated, or destroyed, I do not think you can do very much by opening the dura, and I am of the opinion you will get better results to let it alone, unless you have to open it to evacuate a blood clot, or to relieve pressure that is present. In that case I simply closed up without opening the dura, and left in gauze drainage, which controlled bleeding from the plexus of veins which surrounds the cord.

Now, it is easy enough to do a laminectomy; but the proposition is how are you going to dress the case; how are you going to carry out the after-treatment? I decided to apply a plaster-of-Paris cast, and I could hardly see how I could apply this and get extension. I could not hang the man up, because he was under an anæsthetic, but following the suggestion of some friends and my own ideas, I finally put him on a canvas stretcher which extended from his head to his knees, lifted him on to this, got extension of the whole weight of the body, and applied a plaster-of-Paris jacket, with a window through which I could remove drainage and dress the wound later on.

After that I rigged up a double Hodgen's splint, to keep his leg off of the bed, and also to get a certain amount of traction. In this way you can take care of a patient much better; you can dress him; you can have him placed on a bedpan, and with very little assistance you can raise him completely from the bed by giving him a rope to pull on and by using the Hodgen's splint he can pull himself perfectly clear from the bed; you can change the bed-clothes, apply dressings and change them when you like.

Dr. Fort (closing).—With reference to drainage of the dura, I concede that there is no more important step in laminectomy than the necessity of drainage of the dura. In the first place, it is impossible to know whether you have got symptomatology enough to direct you to do laminectomy. You may have symptoms enough to account for the probable pathology, and almost certainly there is pathology within the dura, blood effusion. You have injury enough or trauma enough to the spinal cord to produce either spinal œdema or excessive effusion, or both. In the past I have had two fatal cases. In one I opened the dura and let the clot out. I did what I thought was the prettiest mechanical operation I had ever performed. I closed it beautifully and the patient had a secondary effusion for a few days and then went to the bad. That is the history of almost all of these cases. It is practically the consensus of opinion to drain the dura in spinal cord injuries.

With reference to the doctor's cases, my idea is that unless you have a fracture of the body of the vertebra, or unless you have a dislocation, and that is not so very common, simply a depression of the spinous processes and laminæ, no mechanical dressing or plaster-of-Paris cast is necessary; but the patient should be put to bed and kept quiet. That is all that is essential. You can remove two or three of the spinous processes and not interfere with the support of the spinal column. In my case, there was no interference with the body of the vertebræ, and the laminæ were removed. That has been my experience in my own cases where I did not have dislocation. The laminæ were removed, the patient put to bed, and the cord dressed; in forty-eight hours he was turned on his side for dressing, as he could not turn himself. You do away with the inconvenience of applying a plaster cast frame, and confinement has much to do with the unfavor-

able condition of these patients. A plaster cast should only be adopted when it is thought to be absolutely necessary and there is no need for retention or fixation dressings, in my judgment, unless we have a fracture of the body of the vertebra.

VARICOSITY OF THE SAPHENOUS VEINS, WITH RESULTING VARICOSE ULCER.

By Robert Carothers, M.D.,
Cincinnati, Ohio.

A service of ten years in a surgical dispensary in one of the large cities enabled the writer to see a considerable number of varicose veins of the lower extremities resulting in varicose ulcers.

These cases came from the riffraff of the city, which made it impossible to follow them to the end except in a very small percentage of cases. I am compelled, therefore, to generalize rather than be specific in the observations made.

The social condition in nearly all cases was that of hard toil: bread won by the sweat of the brow and not by brains. In comparing these cases with a practice among the middle and so-called better classes I am of the belief that a much larger percentage of varicose ulcers are to be found in the laboring classes than is to be found in individuals who are fortunate enough to obtain their livelihood by less laborious methods. This condition applies to the results of and not to the varicose veins themselves, which are seen in all conditions of society.

The sex in these cases was about equally divided. There were about as many women as men.

The ages were from middle life to old age. It was observed not infrequently that varicose veins were encountered in young adults presenting themselves for other conditions, but the troublesome resulting ulcer was seen only after the onset of middle life.

A feeling of discomfort was observed in all cases, ranging

from an irritability or lassitude in some to extreme pain in others.

These cases were all either partially or wholly incapacitated for the performance of their usual avocation.

To the ulcer itself all measures in the nature of treatment which have been advocated were employed. Lotions and salves of all kinds and descriptions, with or without bandages (rubber, cloth, or flannel) for the support of the veins. Direct pressure to the ulcer either by adhesive straps or a flat piece of metal placed on the ulcer and retained by bandages, had its fair trial. Incisions through the ulcer or around the ulcer; curetting the ulcer followed by ointments, or as was done in a few instances, skin grafting had its day in the treatment of these cases. In some few cases confinement in bed with the affected leg slightly elevated, with little or no treatment directly applied to the ulcer, resulted in a speedy cure followed by a recurrence of the ulcer as soon as the individual resumed the upright position and engaged in an occupation which required standing for any considerable length of time. It was these cases under this position or rest treatment which led me to the belief that the ulcer, as troublesome, annoying, and at times as painful as it may be, acts as a drainage to the varicose veins, and is, in a way at least, salutary. I also observed in many of these cases that when the ulcer was open and apparently at the worst the veins to all outward appearance would seem little or not at all affected; after the ulcer was closed and the individual resumed the upright position the varicosity was quite apparent followed by œdema, eczema of skin, ulceration, and relief of the varicosity. One troublesome case early in my experience was put upon antisyphilitic treatment, with a rapid and permanent cure of the ulcer. Constitutional treatment was instituted in all cases meeting the demands of the individual case.

The result in these cases by the various palliative methods of treatment above mentioned was from an absolute failure

in some, though all degrees of success, even to a permanent cure in a very limited number of cases. In those cases resulting in a permanent cure, the treatment used was given full credit at the time, probably followed by an absolute failure in the next case treated in a similar manner. Later reflexion on these few cases confirms my present belief that the good result was due to a change of occupation or a cessation of the active cause rather than the method of treatment employed.

A certain percentage of these cases were sent to hospital for operative treatment. The operations being performed either by Dr. P. S. Conner, Chief of Staff, or by myself. The modern operations were employed, selecting that one which seemed to be indicated in the case under operative consideration. Multiple subcutaneous ligature (Phelps). Complete excision of the varicose veins (Mandelberg). Ligation of internal long saphenous just below the saphenous opening (Trendelenburg). Circular incision partially or wholly around the leg below the knee, through skin and superficial fascia down to the deep fascia ligating the veins as they are cut, then suturing the wound (Schede.) The ulcer was excised and skin grafted in all cases except when quite small, and was then allowed to heal by granulation and cicatrization.

The multiple ligation operation was little used on account of the results by this method being not so satisfactory. The best results were obtained through the complete excisions of the internal saphenous vein, but as this operation required considerable dissection and a long time for its performance it was replaced by the Trendelenburg operation, which is quickly done, but in our experience not quite so satisfactory in results. The complete Schede operation was never done. A partial Schede was performed as an adjunct to the Trendelenburg. The end result in the operative cases, so far as I am able at this time to trace them, has been on the whole very satisfactory and has resulted in a cure in much more than half the number of cases.

Not until there has been more research work done in the pathology of veins will there be a correct etiology of the condition under consideration. The extreme differences in pathological findings of many cases examined has as yet made it difficult to arrive at a definite conclusion.

At the present time two fairly definite conclusions in etiology are accepted:

1. An indefinite congenital venous overgrowth, superabundance of venous tissue, venous angeioma. (Gould.)

2. A yielding of the veins to an increased intravenous pressure due to an obstruction to the flow of blood up to and through the heart. (Gould.)

The first cause has decidedly the better argument in its favor evidenced by the appearance of varicose veins in early life before obstruction causes occur; similar venous conditions found elsewhere in the body (Kollenberger reports a case of varicosity of external jugular in an-eight-year-old boy), and an absence of the usual conditions of venous obstruction in some advanced cases of varicose veins. When the condition of venous angeioma is present, obstruction causes are undoubtedly responsible for an increase in the symptoms and certainly responsible for the end result, œdema and ulceration. This explains the preponderance of extreme cases found among individuals whose occupation requires long hours of standing, aggravated cases following mechanical obstruction caused by intra-abdominal tumors and the gravid uterus, and obstacles to the escape of blood from the veins, such as diseases of the heart, lungs, and liver, resulting by gravity in an overdistention of already diseased veins.

The pathology of varix and varicose veins is not definitely settled, judging from the diversity of opinions expressed. Kollenberger (*Virchow's Archiv*, 1905, Band clxxx., No. 1, p. 129) reports his result from an examination microscopically of one case examined and is probably the best pathological report to be found. The varix he describes as follows: internal coat and external coat remain practically the same; the

changes occurring in the middle coat by an increase both of the muscular and connective tissue. There was not found a uniformity of thickness in the coats, being much thicker at some places than at others. He explains the frequent appearance of the varix on the inner side of knee by lack of protection to the vein at this locality, which is practically between bone and skin and the many slight irritations produced by the bending of the knee. In the vein itself he found practically about the same condition found in the varix. He was not able positively to say inflammatory conditions are responsible for the varicosity. The condition of the valves which are either congenitally deficient, or caused so by the increase in the size of the vein, does undoubtedly play a prominent pathological role. The consideration of the ulcer under this head is deemed unnecessary.

The commonest symptom in varicose veins is pain with a feeling of weight and general weakness of the affected leg. The diagnosis in the vast majority of cases is easy, becoming difficult when the symptoms are obscure and the vein not to be seen.

Treatment. Since the ulcer is caused by the varicose condition of the vein any treatment for its relief without obviating the venous cause is sure to be followed by failure. If, however, the cause is relieved the ulcer is easily and quickly closed in all but a small percentage of cases. When possible the best treatment for an ulcer under these circumstances is excision and skin grafting.

All cases are not operative, therefore palliative methods at times must be considered. They are relief of the active causes, such as change of occupation, removal of mechanical obstruction, and if possible assistance to diseased organs producing obstruction, support of the veins by bandaging the leg, local treatment of the ulcer.

The operations at the present time most commonly employed are:

1. Schede. This operation, which would seem to get its

greatest following from the French, is directed more toward the cure of the ulcer by building a dam between it and the veins than to the correction of any diseased condition of the veins themselves. It is easy of performance and is, in the majority of cases for the purpose intended, successful. The complete operation is not to be advised, judging from a few reports of gangrene of the toes which has followed. As an adjunct to other operations it is of extreme value. It has been a failure in some cases, due to a re-formation of the veins through the wound. (Marion.)

2. Trendelenburg. This operation based on the absence of a valve below the saphenous opening has been decidedly the most popular. Applicable to those cases in which the veins are especially prominent and large in the thigh and when the Trendelenburg test is positive. Easily performed and result usually satisfactory. The principal objection to it is a re-filling of the internal saphenous from anastomosis and recurrence of symptoms.

The most complete, recent, and satisfactory report on the result of this operation is by Goerlich in *Bruns' Beitrage klin. Chir.* for November, 1904, p. 278, the salient points of which I have taken the liberty of using:

Over a period of eleven and one-half years, one hundred and eight patients in all, one hundred and forty-seven legs by this method were operated.

The condition at the time of operation:

Severe	62 cases.
Medium	44 "
Slight	1 "
Negative	1 "
Ulcer	77 "

Length of time the varicosity was in existence:

Less than 5 years	24 cases.
6 to 10 "	20 "
11 to 20 "	23 "
21 to 30 "	20 "
Long period	21 "

Length of time ulcer had existed:

0 to 5 years	47 cases.
6 to 10 "	12 "
11 to 20 "	7 "
21 to 30 "	6 "
Not mentioned	5 "

The ages of these patients are not given. In July and August 1904. All of these cases obtainable were examined either personally or by letter. By letter, twenty-nine cases in which thirty-nine legs had been operated on with the following result:

Absolutely cured	6 cases.
Improved	14 "
Failure	6 "
Made worse	3 "

Personal examination in fifty-one cases, sixty-nine legs with the following result:

Time after operation.

11 to 12 years	5 legs
8 to 10 "	13 "
7 "	12 "
5 to 6 "	15 "
3 to 4 "	8 "
1 to 2 "	16 "

Result in subjective signs or symptoms:

Satisfactory	84 per cent.
Failures	16 " "
Resumed work	$70\frac{1}{2}$ " "
Work made easier	$27\frac{1}{3}$ " "
Incapacitated	1 case

Varices:

Before operation.	After operation.
Marked 49 cases	9 cases.
Medium 19 "	41 "
Slight 1 "	19 "

End result in sixty-nine legs personally examined:

Perfect	19 legs.	27½ per cent.
Re-establishment of current in the internal saphenous through collateral anastomosis . .	42 "	60 " "
From external saphenous . .	4 "	5.8 " "
From pudenda	1 "	1.4 " "
Recurrent œdema and ulceration	3 "	4.3 " "

Complete excision of the internal saphenous vein is undoubtedly the most satisfactory operation to be employed, but until the ingenious invention by Dr. Chas. H. Mayo, of two instruments which subcutaneously strips the vein, it was an operation requiring a long incision, tedious dissection and considerable time for its performance. (*St. Paul Medical Journal*, September, 1904.) This operation as advised by Dr. Mayo is, after a small incision in the upper third of the thigh over the saphenous vein, the vein is located, tied in two places cut between the ligatures and the distal end threaded into the enucleator, which is pushed under the skin along the course of the vein for about six to eight inches where another small opening is made on to the instrument, the vein taken out, then the instrument drawn out from the first opening, re-thread the vein into the instrument and again push it under the skin for another six or eight inches, another small incision on to the instrument allowing the vein to be drawn out which is again ligated and removed. The lateral branches are torn off and as a rule close themselves.

Dr. Mayo has devised two instruments for this purpose, one which looks not unlike a uterine curette, the other a pair of long forceps hollowed out in the blades and when closed form a long tube about one-quarter inch in diameter. This operation is very quickly and easily performed but is not without danger from hemorrhage or sepsis. Since a visit to Rochester I have twice done this operation and the immediate results have been very satisfactory. My cases are too new to say what will be the ultimate result. They were old cases with large troublesome ulcers treated by

skin grafting. They were able to leave the hospital in less than three weeks wearing an elastic porous bandage for support and are now at the end of about eight weeks both at work as housewives.

In one case in which there was a troublesome eczema, after an effort for one week to relieve same, I again followed the advice of Dr. Mayo, sealing the eczematous area with compound tincture of benzoin until the skin wound had healed.

4. Kuller's operation of turning the vein I only mention as I have no experience with it.

5. There is still a class of cases principally involving the external saphenous in which ligature and removal of short areas are indicated.

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DISCUSSION.

Dr. Edward H. Ochsner, of Chicago.—As was stated by the essayist, varicose veins of the leg are extremely common, and the proper treatment of this condition will relieve a large number of sufferers, and consequently, will relieve a great many patients from semi-invalidism. In order to apply the proper treatment in each individual case it is quite important to review for a moment the history of treatment of varicose veins.

About one hundred years ago, a physician in Leipzig by the name of Schreber advised physical exercises in certain advanced

forms of varicose veins for their relief. Later, Nussbaum recommended excision of the ulcer margins; then came Thiersch, who added to that treatment scraping of the base of the ulcer, followed by skin grafting. Later, Trendelenburg discovered that incompetency of the internal saphenous vein existed in a certain proportion of these cases and consequently he excised a few inches of the vein just above the knee; and then Schede followed with his operation, making an oblique incision through the skin and superficial veins. The most recent thing I have seen is the treatment recommended by Schleich, which is ambulatory treatment, which I saw used in his ambulatory clinic last winter.

If one will run over the different methods when a case presents itself for operation one can pick out the operation most suited to the individual case at hand, or very often it is advisable to combine several of these methods in one case. For instance, let us take a bad varicose condition of the leg with a large ulcer. In order to have a permanent result in the greatest possible percentage of such cases it is very important to combine two or three or even more of these operations as the case may be. The first thing to do in such a case, I believe, is to excise two inches of the internal saphenous vein; then to follow this either with the method advised by Dr. Charles H. Mayo, or to do the Schede operation. Then four incisions should be made through the skin and subcutaneous fat about one-half an inch away from the edge of the ulcer, the ends of the incisions not quite meeting. These incisions are immediately sutured carefully. The object in this procedure is to interrupt the vessels which have undergone endarteritic changes and to compel the establishment of a new circulation. Now the margins of the ulcer are excised and the granulation tissue curetted down to the superficial fascia for the same reason and the wound covered with Thiersch skin grafts. In order that the new skin may be as nearly normal as possible it is important that it should be movable. In order that the skin be movable it is important to have the ulcer as completely covered as possible and to secure complete healing in the shortest possible time with the smallest amount of connective tissue. This can be accomplished much more rapidly and in a much larger percentage of the cases if the skin grafting be done by the dry method.

The new Schleich method of treating varicose ulcers by the use of his "Pasta Peptonata" is especially to be recommended in every case where both the deep and superficial veins are involved, for in these cases operation is not only useless, but may be directly harmful. Last winter I saw quite a number of these cases treated in Schleich's clinic and saw ulcers the size of the palm of the hand completely cured in from six to eight weeks by this ambulatory method of treatment.

Dr. Stuart McGuire, of Richmond.—There is an old saying that we must catch a rabbit before we cook it. Before we treat a varicose ulcer we should be certain that it is a varicose ulcer. This was impressed upon me recently by the case of a woman who had sent to me to be operated on for varicose ulcer. A careful examination of the leg showed no varicosity of the veins and the history of the case showed that the ulcer had followed a severe and prolonged attack of typhoid fever and was plainly trophic. It healed with marvellous rapidity after the patient was treated by the method used by Murphy, namely, incision and stretching of the popliteal nerves.

With reference to the Mayo operation for varicose veins of the leg, I would say that like other members of this Association, I have for several years made an annual pilgrimage to Rochester Minn., the mecca of modern surgery. I have seen Dr. Charles H. Mayo use his instrument and I have never seen more brilliant results more quickly accomplished. I do not believe, however, the method will prove safe in the average hands. I would fear to use it myself lest I would have bleeding from collateral branches and the formation of a blood clot the entire length of the vein.

I do not believe in complete excision of the vein on account of traumatism and the exposure of large surfaces to infection. I have not followed my cases carefully, but as far as I know, multiple ligation of the vein followed immediately by excision of the ulcer and by skin grafting have given good results.

I am glad Dr. Ochsner has called attention to the advantage of the dry or open air method in the after-treatment of skin grafting. Like other surgeons, for many years I dressed my cases with pads of cotton soaked in saline solution. I did not get 50 per cent. takes. Since using the dry method, or the open method of treatment, my results have been much more satisfactory. Of course the wound must be protected from

friction or irritation; and as the air must not be excluded, and the simplest and easiest method by which this can be accomplishd is to tie over the seat of the ulcer one of those artificial wire bust forms which can be bought at any dry-goods store. I made use of this in a case a week or so ago and got an excellent result.

Dr. W. M. Perkins, of New Orleans.—We are indebted to Dr. Mayo for the principle of the operation for the relief of varicose veins of the leg. The beauty of the operation is that it can be readily done by any surgeon with a little care.

As to the apparatus or instrument that is used, Dr. Parham brought back an excellent idea, which we have been using in connection with the treatment of these cases for a year, and the results have not only been excellent but very satisfactory. The apparatus we have been using is a piece of wire doubled upon itself; we push the loop through the vein as far as may be necessary; we drag through a piece of heavy pedicle silk gut, through the vein and tie it at one end. We have tried putting a uterine dressing forceps through, grasping the vein and tying it, and if you get a piece of silk through the vein, tying it where you want it, something is bound to come. Occasionally a vein will double upon itself and you may be forced to cut down in the middle and make a second incision. It will occasionally happen, by cutting through the skin and loosening up the vein you continue stripping without having opened it. If you strip the vein from below upward, at least theoretically, the more branches that will come into it the less apt you are to drag collateral branches out of place if you strip the vein from below up. If you strip the vein from the apex of the angle downward, you are apt to drag in collateral branches.

In regard to hemorrhage from the collateral branches, when Dr. Parham operates he has a long roll of gauze ready, and just as soon as he strips the roll of gauze is put over the vein and never moved; a pad is placed over the line of the vein and plenty of gauze in the articular branches for subcutaneous bleeding. The technique has been apparently easy. A piece of sterilized copper wire will do it very nicely.

Dr. Charles H. Mayo, of Rochester.—I have been glad to hear such excellent exposition of the subject by Dr. Carothers and also the discussion. I have operated 185 times by

various methods for the treatment of varicose veins of the leg. It struck me long ago that if we were doing an operation of major gravity on the leg, we would hardly consider the skin veins. If we are doing a resection of the knee joint, we might not even ligate some of the smaller arteries. We would put on a tight bandage. The long incision was a very good operation; it cured cases. But where you incised by the knee joint, no matter how well the wound healed, if you saw the case afterward, quite frequently there was a keloid, an eczema, or separation of the scar through motion of the leg. So I began to undermine the area of the knee joint, going above and below, using forceps, tearing out six or eight inches of the vein. This was comparatively simple. And so various types of forceps were developed.

I think Dr. Perkins is right when he said that we should employ several methods, and the main idea is some method of doing this subcutaneously.

The Bristol method, as used in England, consists of a number of incisions, exposure of the vein and torsion of the nerve without any ligation. They do not ligate the long saphenous.

The Schede operation seems to be adapted for lower work.

It is easy to pick out the cases for the Trendelenburg position. He has the patient lie on a table; he elevates the leg and after the blood has passed out of it, with firm pressure over the saphenous opening, he has the patient stand erect, he removes the pressure, then watches and sees if blood comes up from below, or whether it flows down from above. If it comes down from above the valves are worthless, and that vein is standing the pressure of the height of the body. If we are going to do any one thing that will embrace both methods, the Schede will take care of the lower part with a circular incision; but we know the external vein comes up and dips into the popliteal between the two heads of the gastrocnemii, just before this unites with the larger branch of the internal saphenous, and this has one or more branches which communicate with the popliteal. If we have a vicious circle from the saphenous opening to the popliteal space, then the Schede operation done down in the lower leg is not going to help such cases. If there is one thing we should do it is to take eight inches on the inner side of the knee to get rid of the communication between the external and deep veins with this area of the internal saphenous.

As to skin grafting, I think the method referred to is by far the best, and the mention of the use of a framework to prevent not only infection but the rubbing off of the grafts after they have been placed, is an excellent idea. I think the scheme we have used in the last two years, which works nicely, and is satisfactory for both purposes, is to take ordinary sheets of celluloid which can be bent in any position and put in boiling water; cut the area; make incisions about it; make up two rolls of gauze so as to make them about half an inch thick; wind one around the limb above the ulcer and the other below, after grafting it; take the sheet of celluloid, boil it and bend it, put it over the area and bind the limb up. As soon as the bandage is on you can cut a window over the celluloid plate so that at any time you can see the condition of the grafts.

Dr. Carothers (closing).—I wish to thank the members very much for their free discussion. I want to say to Dr. McGuire that my experience has been the opposite of his. I went to Rochester and while I did not see the operation done, I saw some cases that were operated by this method, and I went home with the determination to do it. I performed the operation in two cases with excellent results. I think it is an easy operation to do. It is true in my next case I may encounter trouble.

THE EARLY DIAGNOSIS AND RADICAL CURE OF CARCINOMA OF THE PROSTATE.

A STUDY OF FIFTY CASES AND PRESENTATION OF A RADICAL OPERATION.

By Hugh H. Young, M.D.,
Baltimore, Md.

In the October number of the *Johns Hopkins Hospital Bulletin* I described briefly an operation for the radical cure of carcinoma of the prostate based on a study of forty cases.[1] Since then I have had ten additional cases and I wish to-day to review the subject in view of these. In the paper above referred to, I discussed first six cases which were seen early in the disease, a diagnosis of benign hypertrophy incorrectly made, and a partial operation therefore performed. (Bottini operation, 4; suprapubic prostatectomy, 1; perineal prostatectomy, 1.) All of these cases subsequently returned with unmistakable evidence of cancer, and only one is alive to-day. A careful study of the pathology of these cases, along with the symptomatology and clinical findings, showed that all presented certain features which may now be taken as suggestive of cancer. A study of thirty unoperated cases and eight autopsies showed that cancer of the prostate may begin as a small indurated nodule in one or both lobes of an otherwise benign hypertrophy, that it remains confined for a long time within the stout capsule of the prostate,

[1] To appear in full in the forthcoming Johns Hopkins Hospita Reports, a volume entitled "Studies in Urinary Surgery."

that its line of invasion is upward along the course of the vasa deferentia and seminal vesicles, and not usually into the bladder around the prostatic orifice, and that the inferior surface of the trigone is usually the first portion of the bladder to become involved.

It thus became evident that if a radical cure were to be attempted the line of incision would have to include the entire prostate with its capsule and urethra, the adjacent portion of the bladder, particularly of the trigone, the seminal vesicles and the ampullæ of the vasa deferentia.

During the course of a year, four cases apparently favorable for such a procedure presented themselves, and the operation above indicated was carried out with little difficulty, slight operative shock, and a very satisfactory convalescence in three cases, and their histories were reported in detail.

During the last six months, ten patients with carcinoma of the prostate have presented themselves, all beyond operative relief but one, and he would not submit to it. One case which seemed fairly favorable was operated upon, but died and autopsy showed extensive involvement of the pelvic peritoneum.

In all of these cases the patients had been treated for a long time by their family physicians and in several instances, by skilful surgeons, and the character of the disease was not recognized. Had it been possible to get these cases earlier, I believe the radical operation, which I have proposed as a routine procedure for all favorable cases of cancer of the prostate, would have resulted in cure.

The early diagnosis of cancer of the prostate is not easy. I am free to confess that I have failed in at least six cases and until confronted by their subsequent development never suspected the malignant nature of the disease. A study of the forty-six cases which I have now had, has brought out the following facts:

1. Symptomatology. Cancer of the prostate may occur at any age after fifty years of age, 57 per cent. of the cases

being between sixty and seventy years of age, the youngest in my series being fifty-three.

The onset symptoms in most cases were similar to those of benign prostatic hypertrophy, viz., slightly increased difficulty and frequency of urination, but in about 30 per cent. of the cases pain was present, an unusual symptom in cases of prostatic hypertrophy. Hæmaturia occurred only four times as an early symptom, and in only about 20 per cent. of the cases was it subsequently present, in only a few as a prominent symptom, and these cases showed cystoscopically considerable intravesical tumor outgrowth, generally of a villous type.

In a few instances the prostatic trouble ran a long course, having been present twenty years in one instance, but in these cases the disease probably became malignant many years after its onset. As a rule, there has been a more rapid increase in the severity of obstructive symptoms than in benign cases, leading to an early large residual urine. In some cases, however, there has been little residuum and the bladder has been contracted.

Pain has been a prominent symptom often entirely out of proportion to the extent of the disease and the obstruction present. It generally appeared as a dull pain in the suprapubic region, which became worse as the bladder became full. During urination in about 25 per cent. of the cases, there was pain in the urethra, often referred to the end of the penis, but sometimes limited to the deep urethra or perineum. Pain in the rectum has been present in only 10 per cent. of the cases, and seems to have no relationship to the extent of the involvement in the pelvis, being noticeably absent in a number of cases of extensive prostato-pelvic carcinosis. The same may be said for pain in the lower extremities, hips, thighs, buttocks, and along the sciatic nerves, having been present in cases of slight and absent in others of considerable involvement. But when present, pain in the rectum and lower extremities is a very suspicious symptom and should strongly suggest malignancy. Loss of

weight has been a prominent symptom, often occurring early in the disease, and being much more pronounced than in simple hypertrophy cases.

Clinical Findings. The prostate was considerably enlarged in about 70 per cent. of the cases, but many of these were seen late. When the disease has still been confined to the limits of the prostate proper it has generally been found only moderately enlarged. In such cases portions of the prostate have in a few instances been soft, but marked induration generally involving almost all of the prostate, has been found in nearly all of the cases. The surface of the prostate was smooth in most instances and only rarely rough or nodular until late in the disease.

In one early case there was a small prominent rounded induration at the apex of the prostate involving also the membranous urethra. In later cases the region of the seminal vesicles has shown induration, and often a characteristic hard plateau extending across the intervesicular space from one vesicle to the other and presenting a concave, sharply defined upper border to the finger has been present. Study of pathological specimens has shown this to be composed of a cancerous invasion of the vasa deferentia and the tissues between them and the trigone. An unusual thickness in the retrourethral portion of the prostate (the posterior commissure) as shown by an instrument in the urethra and a finger in the rectum was nearly always present.

Enlarged pelvic lymphatic glands have been found in only a small number of even the more advanced cases, and as they are occasionally present with ordinary prostatitis their presence or absence is of little diagnostic or prognostic value unless they are a prominent feature. A remarkable characteristic of cancer of the prostate is that it metastases directly to the osseous system more often than to the glands.

The *cystoscope* has been of the greatest assistance in making the diagnosis of early cases, as it has shown a distinct and radical difference in the intravesical picture, from

Fig. 1.

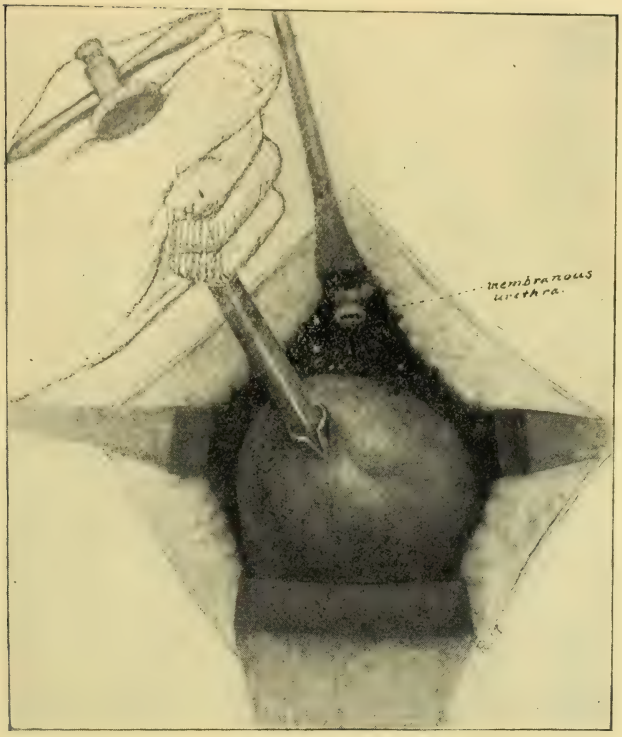


Fig. 2.

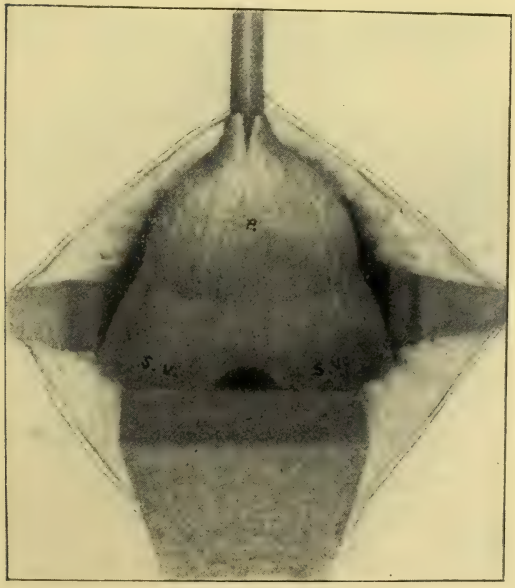


Fig. 3.

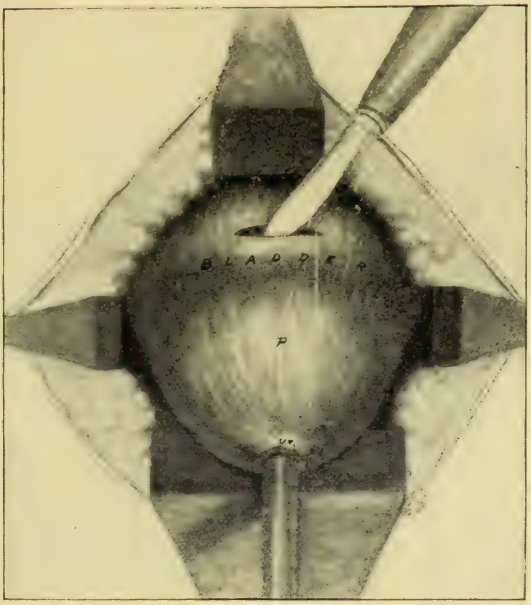


Fig. 4

Fig. 5.

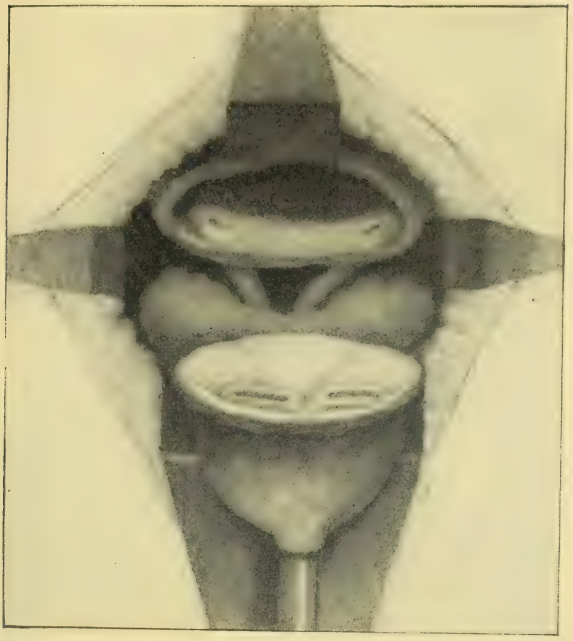


Fig. 6.

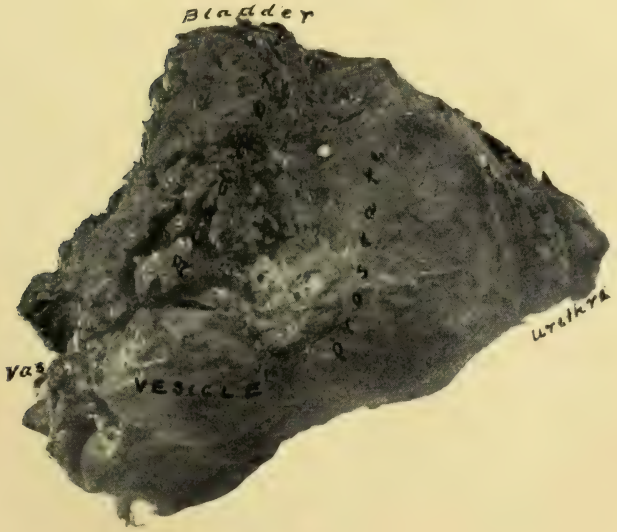
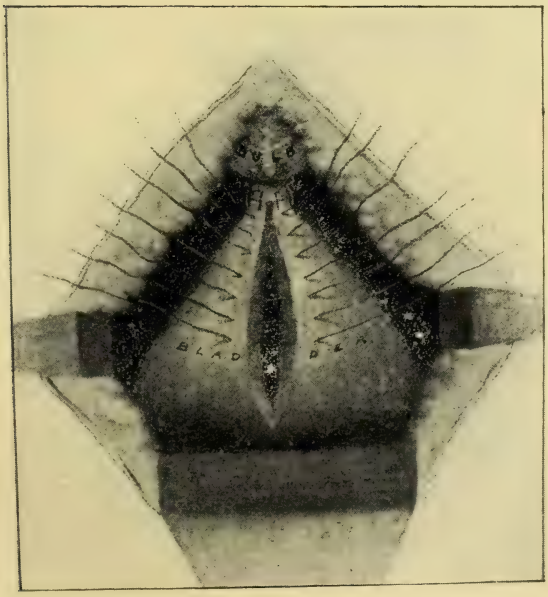


FIG. 7.

FIG. 8.



that seen in cases of benign hypertrophy. In the latter, one usually sees two or three rounded intravesical lobes with deep sulci between and a pronounced bas fond behind them.

In early cases of carcinoma of the prostate, there has been practically no intravesical enlargement to be seen in most cases, and the entire absence of deep intervening clefts has been a constant finding in even the great majority of the advanced cases. Except in those rare cases in which intravesical tumors were present, if any intravesical prostatic enlargement were visible it was generally only a slight enlargement of the median portion. A picture of diagnostic importance is an elevation and puckering of the mucous membrane of the anterior portion of the trigone—due as I have found to the intervesicular mass of disease involving the trigone and leading to its contracture. Ulceration and intravesical tumor formation has been very rare in this region, and then only very late in the disease.

Before withdrawing the cystoscope I have always inserted a finger into the rectum, and the finding has nearly always been entirely different from that in benign cases. There has always been a much greater thickness in the retrourethral portion of the prostate, the median portion being especially thick, and the consistence very hard. In later cases, in which the disease has passed above the prostate into the retrotrigonal area, it has been impossible to feel the beak of the instrument in the bladder.

Early diagnosis then may be based upon a suggestive history (rapidity of growth and pain) an indurated prostate, a strictured condition of the prostatic urethra near its apex, and the absence of intravesical lobes as shown with the cystoscope. All of these are rarely present together, but generally enough are to make the diagnosis clear. An induration of the prostate, coming on without recent prostatitis, without catheterism, or an infected bladder, in a man past fifty, with symptoms of urinary obstruction, and particularly

with pain, should make us suspect cancer at once, and a perineal operation should be undertaken to settle the diagnosis. If residual urine in considerable amount is present without the presence of intravesical lobes as shown by the cystoscope, our suspicion may be considered further strengthened. But if we are unable to be certain we can expose the prostate as for ordinary prostatectomy and then by inspection and palpation make certain in most of the cases. In some instances I have still been uncertain, and have then made bilateral capsular incisions and excised small portions of the lateral lobes for microscopic study. In two cases it was shown that the irregular induration was due to seed calculi of the prostate gland and in two other cases it was necessary to have frozen sections prepared before we could be certain of the nature of the disease. With a surgical pathological laboratory adjacent it has been possible to get a nicely stained section for microscopic study in six minutes, and I have considered this worth waiting for in several instances.

I have therefore proposed to follow the procedures above described in all suspicious cases, and repeat that those with areas of stony induration, with pain as a prominent symptom and little intravesical prostatic enlargement may be considered suspicious.

As to a Radical Operation. As stated above operations and autopsies have demonstrated that the entire prostate with its capsules and urethra, the seminal vesicles, the ampullæ of the vasa deferentia, and the superjacent portion of the vesical trigone must be excised in one piece if we are to expect radical cures.

A study of the literature of cancer of the prostate shows that this operation has not been done before for the disease. I have excluded the case of Kuster, who removed the entire bladder and transplanted the ureter into the rectum, and the case of Harris, who excised most of the bladder with the prostate (seminal vesicles not mentioned) and transplanted the ureters into the vertex of the bladder. Both of these were

suprapubic operations and the patients lived five days and five months respectively.

Two cases of Demarquay and that of Czerny, in which the anterior wall of the rectum was excised, have also been excluded.

The operation which I have carried out in six cases as a routine procedure for cancer of the prostate is described as follows in the history of one of the cases: an inverted Λ cutaneous incision was made in the perineum as in the operation employed by me for simple hypertrophy of the prostate —each branch of the incision being about two inches long. By blunt dissection the end of the bulb and central tendon were exposed, and the latter divided, exposing in turn the rectourethralis muscle, the division of which gave free access to the membranous urethra behind the triangular ligament. Urethrotomy upon a grooved staff was followed by introduction of the prostatic tractor, which was opened out after it reached the bladder. While traction was made upon this instrument the rectum was carefully separated from the prostatic capsule by blunt dissection until the entire posterior surface of the prostate was brought into view. Up to this point the operator proceeded exactly as in the usual prostatectomy operation. The tissues around the prostate were more hemorrhagic and the wall of the rectum more closely adherent to the capsule of the prostate than usual. Examination of the prostate then showed much greater induration than I have ever encountered in the benign prostate. The rectum and periprostatic tissues were free from invasion. Complete excision was therefore decided upon and carried out as follows: the handle of the tractor was depressed, thus exposing the membranous urethra anterior to it as a point where it was easily divided transversely with a scalpel, leaving a small stump of the membranous urethra protruding from the surface of the triangular ligament. By further depressing the handle of the tractor the puboprostatic ligament was exposed, and being very tautly drawn, easily

divided by scissors, thus completely severing the prostate from all important attachments (except posteriorly) as shown in Fig. 1. The lateral attachments, which are slight, were easily separated by the finger. During these manipulations a moderate amount of hemorrhage was encountered (coming from the periprostatic veins, particularly those just behind the triangular ligament in front of the prostate), but it was easily controlled by clamping several bleeding points, and applying pressure with gauze by means of an anterior deep retractor (Fig. 3).

The posterior surfaces of the seminal vesicles were then freed by blunt dissection, the now mobile prostate being well out of the wound, as shown in Fig. 2. In this exposure of the posterior surface of the vesicles I was careful not to break through the fascia of Denonvilliers, which covers not only the posterior surface of the prostate but also of the seminal vesicles, and forms I believe an important barrier to the backward growth of the disease.

The next step was to expose the anterior surface of the bladder, which was easily done by depressing the tractor and making strong traction. By this procedure the bladder was drawn down so close to the skin wound that it was easily incised at a point in the middle line about 1 cm. behind the prostatovesical juncture, as shown in Fig. 3.

By means of scissors the division was continued on each side until the trigone was exposed (Fig. 4). After swabbing away the blood and urine the ureters were easily found and the line of incision carried across the trigone with a scalpel so as to pass about 1 cm. in front of the ureteral orifices.

While still making traction upon the prostate the base of the bladder was pushed upward with the handle of the scalpel, thus exposing the anterior surface of the seminal vesicles and the adjacent vasa deferentia (Fig. 5), all of which were carefully freed by blunt dissection with the finger as high up as possible, so as to remove with the vesicles much circumjacent fat and areolar tissue on account of the lymphatics

which they contained. The vasa deferentia after being drawn well down were picked up on a small blunt hook and divided with scissors as high up as possible, care being taken to see that the ureters were not in danger.

After division of the vasa deferentia, the seminal vesicles were found to come down more readily, the deep adhesions were finally divided and the mass shown in the photograph (Fig. 6) was removed. As seen here in the side view, a portion of the membranous urethra, the entire prostate with its capsule intact, the seminal vesicles, 4 cm. of the vasa deferentia and a cuff of the bladder 1 cm. wide along the anterior and lateral surfaces and 2 cm. wide in the region of the trigone has been removed in one piece. Fig. 7 shows the posterior view of the tissues removed.

There now remained a large defect to repair. The vesical opening was about 8 cm. in diameter and had sunk far back in the depths. The stump of the membranous urethra had been obliterated by the compression of the anterior retractor, so that it was necessary to insert a soft rubber catheter through the urethra from the meatus to discover it. The anterior wall of the vesical opening was then caught with forceps, and I was surprised to find how easily it could be drawn down to the membranous urethra, where an anastomosis was readily made, as shown in Figs. 8 and 9. The first suture was placed by inserting the needle into the triangular ligament above the urethra and out through the anterior wall of the membranous urethra, then through the anterior wall of the bladder in the median line from within out, care being taken to include only the submucosa and muscle. When this suture was tied, the median line of the anterior wall of the bladder was drawn to meet the median line of the roof of the remaining membranous urethra, the knot outside and the thread left long.

Lateral sutures similarly placed (including the periurethral muscular structures below), and two posterior sutures completed the anastomosis of the membranous urethra with

a small ring into which the anterior portion of the margin of the vesical wound had been fashioned by the tying of the sutures, as shown in Fig. 8. The remainder of the vesical wound now presented a longitudinal opening, which was easily closed by sutures placed as shown in Fig. 8, thus completely closing the defect and replacing the prostatic urethra with a funnel-shaped process made by the bladder wall. The sutures used were silk, one end of each being left long and brought out of the wound so that they could be extracted later (since then I have found alternate sutures of catgut and silkworm gut, also left long, the best). After light gauze packing had been placed in various portions of the wound, the levator ani muscles were drawn together with catgut (two sutures) in front of the rectum and the skin wound closed on each side with interrupted catgut sutures, leaving only a small portion open at the angle in front for exit of the gauze drainage. The rubber catheter (which was of considerable service in making the anastomosis of the urethra and bladder) was fastened in place by adhesive plaster around the penis, and the patient was returned to the ward. During the operation, he received 1000 c.c. salt solution infusion beneath the breast, and his condition throughout was good, the pulse varying from 65 to 92, and being 80 at the end of the operation, which required two hours.

A study of the specimen removed showed adenocarcinoma involving the entire prostate, the region between the seminal vesicles and the inferior surface of the excised trigone and the vasa deferentia. The capsule of the prostate and the bladder at upper limit of excision were free.

Convalescence. Patient convalesced well. Left hospital May 30, 1904. Perineal wound healed tight; no difficulty in urination; able to hold urine for three or four hours at night; incontinence in the day.

Results. As remarked above this radical operation has been performed on six cases with one operative death. The

autopsy in this case showed extensive intraperitoneal metastases and explained the cause of death. Two cases have died since the operation; one, one year later from an operation for vesical calculi. Autopsy showed a small mass of carcinoma adjacent to the left vas deferens about the size of a pea. This was the only cancerous tissue to be found, there being no metastic glands or osseous metastases made out. The recurrence had been predicted in this case after a study of the operative specimen which showed carcinoma near the upper end of the left seminal vesicle.

The other case died two months after the operation of nephritis. Autopsy showed that the cancer had been thoroughly extirpated, a careful search failing to reveal any malignant disease, regionary or metastatic. Numerous sections were made of the pelvic tissues. It therefore seemed evident that had he lived he would have remained cured of the cancer.

Three cases are living and well: one ten months, one eight months, and one, one month after the operation. One case has control over his urine and can hold it several hours. One has incontinence in the day, but perfect control at night. The third is still in the hospital. All have been completely relieved of the severe pain of which they suffered before operation. None of my cases were particularly early cases. With an early diagnosis and operation the operative mortality should be nil, as only the cases with extensive (unrecognized) peritoneal metastases showed any shock.

Conclusions. Cancer of the prostate is quite a common disease, about one case in seven of prostatic enlargements in men past fifty being cancerous. It is characterized by induration—often of stony hardness, and pain is frequently present. The early diagnosis may be made on marked induration, and the absence of the usual intravesically projecting lobes, as shown with the cystoscope—the prostatic orifice often appearing normal. The disease is often of slow growth and remains for a long time confined within the

limits of the firm prostatic capsule. The operation carried out by the writer in six cases is necessary if a cure is to be expected and is not difficult of performance, and furnishes remarkably satisfactory functional results. With early diagnosis the mortality should be nil, and the percentage of cures large. The general practitioner should suspect every indurated enlarged prostate and submit the patient to a perineal operation, when if it proves malignant the radical operation can be done.

DISCUSSION.

Dr. Mack Rogers, of Birmingham.—The chief point that interests me in this excellent paper is that the disease does not involve the bladder *per se*. The question that arises in my mind is why Dr. Young should dissect off the bladder so extensively as he does. Could not the gland be peeled off without cutting the bladder so extensively, and in this way eliminate the disease posteriorly? I understand thoroughly all the other steps of the operation but that question is not clear to me as to the necessity of going through and making such a wide sweep through the bladder.

Dr. Horace J. Whitacre, of Cincinnati.—I would like to ask one question regarding the technique of this operation described by Dr. Young. The subject interests me very much because in a rather limited experience I have encountered two cases of cancer of the prostate which were probably operable by this method. It seems to me that we will encounter considerable hemorrhage. In our operation of prostatectomy we feel we are safe when we are within the capsule, and we run more or less risk when we get outside of the capsule on account of hemorrhage from the prostatic plexus. I would like Dr. Young to speak of this in closing the discussion.

Dr. Edward H. Ochsner, of Chicago.—I have had no experience with this particular operation. I think, however, the question that Dr. Rogers asked with reference to the necessity of incising so much of the bladder is very pertinent. I am sure we should consider the advisability of this operation whenever there is any considerable carcinomatous involvement.

Dr. Young (closing).—In answer to Dr. Rogers' question

I will say that I meant that the disease was not present as a tumor in the bladder. But a study of the pathological specimens shows this: The disease passes through the prostate; it involves, as a rule, the seminal vesicles, the vasa deferentia, and the tissues between them and the posterior surface of the anterior part of the trigone, but does not invade the mucosa until later. A radical operation must include the prostate with its capsule and urethra, the seminal vesicles, and the anterior half or two-thirds of the trigone. If you were to do an operation which included only the prostate and the seminal vesicles you would have to cut the prostate off from the bladder, and that would leave a bladder opening which you would have to draw down and suture to the membranous urethra (because you have removed the entire prostate with its capsule). Owing to the great simplicity of drawing the bladder down and suturing it, I see no advantage in taking a great risk of leaving cancer of the trigonal lymphatics by going too close to the disease. I follow the precepts of Dr. Halstead in his breast work. You will doubtless remember that Halstead in the beginning of his work advocated not only thorough dissection, but he went wide of the diseased area, and while surgeons of prominence at that time condemned such a radical operation, they have now come around to Halstead's view and are doing his operation. The same radical procedure holds good with reference to these cases of cancer of the prostate. Considering the rapidity and ease with which the bladder can be drawn down and the perfect or excellent functional results I think you make a mistake if you do not take away that portion of the trigone which is above the cancer of the seminal vesicles.

As regards hemorrhage, there are three points from which hemorrhage may occur to bother you. When you cut the membranous urethra and puboprostatic ligaments from the prostate you are apt to get hemorrhage, and it is my plan to apply three or four clamps, put a wad of iodoform gauze there and an anterior retractor against it, by having the assistant keep the retractor up against the pubis, and then hemorrhage does not bother you. You do not get any more hemorrhage until you begin to cut the bladder and there is very little from that, as a long clamp can be applied so as to control the hemorrhage.

The point of the operation which is of greatest importance is the removal of that portion of the trigone. Do not try to save this insignificant piece of trigone which will not help you in drawing the bladder down and in making the anastomosis. The anastomosis is easily made.

In the four cases that have recovered, one is struck at once with the splendid functional results obtained and the absolute freedom from pain. These patients are able to void urine in a good stream. There is no comparison between their condition now and previously, when they had almost continuous pain and occasional hemorrhage.

If we can get practitioners of medicine and surgery to make early diagnoses, while the disease is confined to the prostatic lobe, being suspicious of every case of enlargement of the prostate, especially those characterized by marked induration, and those that come on late in life without previous urinary or prostatic infection, by doing prostatectomy early, we should cure a large percentage of these cases of cancer of the prostate. According to recent statistics fully 50 per cent. of the cases of carcinoma of the breast are cured. The prostate is a gland that is surrounded by dense fascia, consequently general lymphatic infection is less likely to occur, and the chances of making an early diagnosis and obtaining a radical cure are, I believe, fully as good as in cases of carcinoma of the breast.

SCOPOLAMINE-MORPHINE-CHLOROFORM ANÆSTHESIA.

By H. J. Whitacre, B.S., M.D.,
Cincinnati, Ohio.

The very attractive results reported in the literature from the use of scopolamine in combination with morphine for the production of surgical anæsthesia have led me to make an application of this method in forty cases.

This work was undertaken under the impression that scopolamine was a practically harmless drug which could be given without danger to the patient. A review of the twelve deaths which had been reported in the articles read at this time did not seem to justify a conclusion that the scopolamine was directly responsible for any of these deaths.

The observations upon my cases were conducted with the assistance of Dr. Mary K. Isham, who has reported our general results to the Cincinnati Academy of Medicine and published this report in the *New York Medical Journal*, November 25, 1905.

This paper deals with the literature of the subject, the nature and characteristic of the drug, and the reaction of patients to its use. I shall not, therefore, repeat the observations made regarding these points except to state that barring irregularity in the action of the drug and some difficulties in the accurate application of the method a vast majority of our patients enjoyed a freedom from the preoperative and the postoperative discomforts which was certainly most gratifying.

The profound reaction of our patients to the drug, the great increase in the pulse frequency of a very few patients, one death which was not a scopolamine death, and the report of additional cases of death occurring in connection with the use of this anæsthetic, have raised in my mind the question of its safety.

If the anæsthetic is safe there is abundant reason for its use in surgery, if possibly not, this question should be definitely determined. The dangers have certainly been sadly misrepresented on both sides.

I shall, therefore, confine my remarks to the dangers of the anæsthetic. First let us analyze the deaths which have thus far been reported from this anæsthetic. Blos[1] has reported a death as follows: A man, aged fifty years, presenting emphysema of the lungs, very marked pulmonary tuberculosis, cardiac degeneration and tumor of the intestine, pelvic tuberculosis with caries of the ilium and sacrum, incontinence of fecal matter and albuminuria. An operation for resection of the sacrum of the tuberosity of the ischium and ascending left branch of ischium was done. There was a great hemorrhage during the operation. After operation the patient seemed to sleep tranquilly. Six hours afterward he died through progressive enfeeblement. At the autopsy there was proved a pulmonary tuberculosis and an amyloid degeneration of the kidney and liver. It would seem most unjust to attribute this death to scopolamine.

Flateau[2] reports a death in a woman, aged fifty-two years, upon whom he performed an operation for ablation of a polyp of the uterus after incision of the neck. Sleep was profound during the operation, which was perfectly borne; but for four and one-half hours afterward some tracheal rales appeared, the pulse became rapid and feeble, respiration irregular, assuming the Cheyne-Stokes type. Acute œdema of the lungs developed, and the patient died several hours after this happened. No autopsy was made. Flateau adds that the cause of death seemed rather an exhaustion

which reached the third degree, and degeneration of the heart due to the anæsthetic. The question naturally arises as to whether or not scopolamine was the cause of the œdema of the lungs.

Terrier and Desjardins[3] reason that the experiments of Guinard (de Lyon), which have shown that a patient must have either aortic or renal insufficiency in order to have an acute œdema, would rather exclude the injections as a sufficient cause in themselves to produce this lesion. It is much to be regretted that an autopsy was not made in this case.

Dirk[4] reports three deaths, one in a woman, aged seventy-three years, who had a bad cancer of the rectum, had had a previous operative procedure, and had an artificial anus. Two injections were used previous to a further operation. The other two cases were aged sixty-nine and seventy-six years. These also suffered from chronic ileus, the result of carcinoma of the rectum. In both of these cases a diffuse purulent peritonitis was present at the time of operation. All three patients developed after the operation a comatose condition. The breathing was labored, resembling the Cheyne-Stokes type. The reflexes were fully lost, the pulse was small and delayed, and death occurred after five to seven hours. It certainly must be granted that these were three desperate cases in which the death can be explained much more rationally in some other way than as a result of the use of scopolamine.

Israel[5] reports three deaths in three hundred and thirty-two cases in discussing Dirk's paper. In the first case death occurred with the first cut of the skin in a patient who had taken 45 c.c. of ether. This patient had had anuria for eight days, was dark blue, and presented a most unfavorable case for any form of anæsthesia. Whether he could have lived with any other or without any anæsthetic the author does not state, but he says that never before has he had a death during narcosis with other anæsthetics in anuria of even longer standing. Terrier believes that it

would be more logical and reasonable to place this death to the account of ether, which was absorbed by the patient at the moment of death, than to the account of scopolamine, which had been well borne for several hours; furthermore, he states emphatically that ether and scopolamine are incompatible and that a gross error of technique was committed in this case. Most other observers do not support Terrier and Desjardins in this view; indeed, Kochmen believes that it is particularly indicated before ether narcosis, since the discomforts of ether are more marked than those of chloroform; second, because it arrests secretion and thereby lessens the chances of pneumonia. He maintains that the hyperæmia of the respiratory mucosa after ether is purely secondary to hyperglandular activity, and that the use of scopolamine will prevent this hypersecretion even though it may dilate the bloodvessels of this membrane.

It must be granted that this was an extreme case and that the death might well have been explained otherwise by an autopsy.

Israel's second case was a patient to whom scopolamine had been given the day before operation, but through lack of time the operation was not performed. The same dose was given the next day with 18 c.c. of chloroform. He was a rather weak man, with unilateral tuberculosis of the kidney and no complicating lesions in other organs. The operation went smoothly, but afterward there was a striking restlessness and a pulse frequency of 120. This condition of restlessness and high pulse rate without fever and without disturbance of kidney function continued for three days, then on the fourth day he fell out of bed in his restlessness, lost consciousness, and died on the same day. Autopsy showed no tuberculous disease in the other kidney, no wound trouble, but a very flabby, yellow colored heart, with high degree of fatty degeneration of the papillary muscles, fatty liver, and an acute cloudiness and swelling of the remaining kidney.

Israel's third case was very similar. This case was a young, unusually strong woman, who entered the hospital with peritonitis due to ruptured pyosalpinx. Scopolamine and morphine injections were given together with 25 c.c. of chloroform. At operation a moderate peritonitis was found. In the first twenty-four hours the progress was excellent; there was no vomiting. During the second twenty-four hours there was the same condition of restlessness that has been described in the previous case. In the third twenty-four hours there was a condition of drowsiness, coma, analgesia, strong contraction of the pupils, and minimum secretion of urine—40 c.c. in twenty-four hours. The patient died on the fourth day. On autopsy extreme fatty degeneration of the kidney, liver, and heart was found, with no swelling of the spleen. The autopsy findings were exactly those of extreme phosphorus poisoning. The condition of the spleen and peritoneal cavity rule out sepsis.

At this point I should like to report the only death in our series of forty cases, which occurred in any connection with the anæsthesia. This occurred in a schoolboy, aged fifteen years, who was first seen four days after the beginning of an attack of acute appendicitis with rigidity of right abdomen, temperature of 102°, pulse of 110, and a typical history.

It was deemed wise to wait for a few days before operating. The temperature became almost normal after six days of complete rest and the local symptoms improved. On the tenth day the temperature again began to rise and a localized abscess was diagnosticated. Two injections of scopolamine, grain $\frac{1}{100}$, and morphine, grain $\frac{1}{6}$, were given two and one-half and one-half hour before operation and 6 drachms of chloroform were used during the operation to complete the anæsthesia. An anterior incision was made; an abscess containing perhaps two ounces of pus was drained posteriorly, the appendix was removed, and the patient put to bed in good condition with posterior drainage. The pulse

was 80 and 84 before scopolamine and 80 after the use of scopolamine; it increased somewhat during operation and was 118 when he was returned to bed.

A three hourly record of the pulse after operation reads 100, 98, 86, 84, 80; respiration during this entire period varied from twenty to twenty-four. During the next twenty-four hours the general appearance of the patient was not satisfactory. He seemed to be dull and listless, his temperature was 96.8°, pulse 84, respiration 18; but liquids were taken and there were absolutely no symptoms of peritonitis or wound trouble.

During the third twenty-four hours the condition of listlessness grew more marked; he slept a great deal, was very pale, and looked badly; temperature remained subnormal; the pulse ranged from 72 to 92. At the end of the third day temperature rapidly came up to 100°, later to 102.4°. On the evening of this day the patient was taken to the operating-room with a pulse of 120 and temperature of 102°. No symptoms of peritonitis were apparent, but a puncture was made above the pubes for pelvic drainage if pus should be found. The peritoneal cavity was normal, however, and wound conditions were satisfactory. The patient died in coma at three o'clock the next morning, with all the symptoms of profound intoxication. Unfortunately, the urine was not examined for acetone. On postmortem examination wound conditions were found satisfactory. The liver was flabby and very yellow and the kidneys presented a similar appearance. Permission was not granted for a complete autopsy and the heart was not removed. On microscopic examination an acute yellow atrophy of the liver, extreme fatty degeneration of the kidney and of the intestinal mucosa were found.

Here are three cases of fatty degeneration of the parenchymatous organs which have occurred after the combined use of scopolamine and chloroform. In view of the valuable work reported by Bevan and Favill[6], Guthrie,[7] Fraenkel,[8]

Offergeld,[9] Müller,[10] and others upon the occurrence of late poisonous effects after the administration of chloroform, manifested chiefly in a fatty degeneration of these organs, it seems to me but just that we should attribute these deaths to this well-established cause and not to the scopolamine used. I have instituted animal experiments for the study of this question, but unfortunately cannot give more than a preliminary report at the present time. I have repeated the experiments of Offergeld and Müller, and fatty degeneration has regularly followed the prolonged administration of both chloroform and ether. One interesting point has developed. At least some of our animals have developed a fatty degeneration of the liver when chloroform was used and of the kidney when ether was used, but not of any other organs.

In order to study the effect of scopolamine and of morphine and scopolamine in combination upon the anatomical integrity of the parenchymatous organs, ten animals (dogs, cats, and guinea-pigs) were given repeated doses of scopolamine, grain $\frac{1}{100}$, for eight to fourteen days. Most of these animals showed marked degenerative changes in some degree, and five showed distinct fatty degeneration of the liver and kidney, two a probable fatty degeneration of the heart.

Ten animals (dogs, cats, and guinea-pigs) were given scopolamine, grain $\frac{1}{100}$, in combination with morphine, grain $\frac{1}{6}$, for corresponding periods of time. Most of these animals showed degenerative changes in the parenchymatous organs. Five showed fatty degeneration of the kidney and of the liver.

While these animal experiments show a fatty degeneration of the liver and kidney after continued doses, further experimentation will be necessary to demonstrate that one, two, or three doses would produce a like effect. It seems to me improbable. It certainly is true, however, that both plain scopolamine and the combination of morphine and scopolamine will produce this effect in continued doses. It is

possibly true that the administration of this drug to the patient suffering from such degenerative changes of the organs might increase or precipitate this degenerative change.

Israel has suggested and Landau[14] has repeated the suggestion that the combination of scopolamine with morphine may inhibit the excretion of chloroform from the system and that a retention of even a small dose of chloroform for a long period will produce the fatty degeneration. It would probably be difficult to study the process of excretion from the liver, but our series of cases seemed to show a larger excretion of urine after this form of anæsthesia than usually occurs after the administration of pure ether or pure chloroform. Orth has expressed an opinion on Israel's cases that the fatty degeneration was the result of the use of scopolamine. The fact remains that these patients have suffered a lesion precisely similar to that which has followed the administration of chloroform alone in no greater amount, and the lesion is now looked upon as the definite result of chloroform poisoning. I shall, therefore, class these deaths among the late poisonous effects of chloroform.

Wild[11] has reported a case which for purposes of complete discussion should be included among the deaths. This case of empyema of the antrum was given 1 mg. scopolamine and 6 cg. of morphine, and forty-five minutes later a second dose of one-half the amount of each drug. Sleep was not induced and anæsthesia was completed by means of 45 c.c. of ether. The pulse was 116, breathing 12, later 10 per minute. After operation the patient slept, reacted to calling, the breathing was irregular, 10 per minute, and face cyanotic. Two hours later the breathing took on a type which resembled Cheyne-Stokes respiration. In a period of fifteen seconds there were 7 to 9 superficial respirations, then a pause of fourteen to fifteen seconds, then again a superficial breathing. It differed from Cheyne-Stokes respiration in that all respirations were of equal length and depth. During breathing the pulse was full and strong;

with the pause it became smaller and slower, and disappeared almost entirely. By calling and shaking cannot awaken patient. Chin dropped backward, but dragging jaw forward and pulling on tongue does not influence respiration.

Three hours later there was a change for the worse, the patient looked grayish white, had the appearance of one dead, could not be aroused, had rattling breathing, and pulse was practically gone. The pupil was widely dilated, cornea glassy, all reflexes gone. Through artificial respiration, camphor injections, salt solution, and faradization for one hour the pulse, breathing, and reflexes began to return. The condition steadily improved and at one o'clock that night the patient awakened as from a deep sleep.

He fully recovered. A lung affection did not result, which would seem to rule out the question of inspired blood. It will be noted that this patient received 1.5 mg. of scopolamine and 9 cg. of morphine, a huge dose.

It is a well-known fact that symptoms of poisoning have followed the use of $\frac{1}{4}$ or even $\frac{1}{10}$ grain of morphine. This patient received $1\frac{1}{3}$ grains of morphine in forty-five minutes. The symptoms are furthermore those of morphine poisoning and should not be attributed to scopolamine.

Bakes[12] in three hundred cases of scopolamine-morphine anæsthesia lost three patients. The first case, a patient, aged eight years, had extensive old osteomyelitis of the femur. One hour before the operation the patient received 0.5 mg. of scopolamine and 1.5 cg. of morphine. He also received 30 g. of ether. There was much hemorrhage at the time of operation and salt infusions became necessary. Toward the end of the operation the pulse became more and more frequent, all stimulation failed to cause improvements, and the patient died. Autopsy revealed widespread amyloid degeneration of the heart and all of the parenchymatous organs.

His second death occurred in a patient suffering from

extensive carcinoma of the uterus, which was extirpated according to Wertheim. One dose of 1 mg. of scopolamine and 2.75 cg. of morphine was given one hour before operation. Later 308 of ether were administered. In removing the cancerous glands the iliac vein was excised. From this on the pulse changed for the worse, became 120 to 130, and in spite of all stimulation the patient died one hour later from heart weakness.

Both of these, it seems to me, were desperate cases which would have died under any anæsthetic and should be classified as death from shock and hemorrhage.

Bakes' third case cannot be so readily explained. This occurred in a woman, aged sixty years, who was robust with an apparently sound heart. One hour before operation 0.8 mg. of scopolamine and 2 cg. of morphine were given and 60 g. of ether were administered later. A sarcoma of the neck the size of a child's head was excised. The common jugular vein and external carotid artery were removed. Loss of blood was slight at close of operation, pulse was good, nobody thought of a bad result. After operation there appeared gradually signs of heart weakness, and in spite of everything that could be done the patient died four hours after operation. There was no wound bleeding and no nerve inclusions. Autopsy was refused.

Landau[14] reports a death which was very similar. This occurred in a man, aged sixty-six years, with moderate arteriosclerosis, who was operated upon for hemorrhoids which had given him pain for several years, but had bled only in the usual way for a few days before operation. There was no anæmia.

Two hours before operation 0.9 mg. of scopolamine and 2 cg. of morphine were given and induced deep narcosis. Four internal hemorrhoids the size of a hazelnut were excised after the injection of 3 cg. of cocaine at the base. There was very little hemorrhage and wounds were sutured, the veins were not thrombosed and a tampon was inserted.

The patient awakened one hour after operation, was restless, complained of pain, and threw himself about. The pulse during operation was very good. There was no more cyanosis than is usual. Two and one-half hours after operation there was a sudden heart collapse, which slowly yielded to stimulation. One-half hour later the pulse again became very weak, and in spite of all stimulation the patient died with a picture of heart failure. An autopsy was not made.

He states that the skeptic will think of thrombosis of the coronary artery or embolus from the wound, but he refers to the distinctness of the symptoms as those of a toxic heart failure.

Dr. J. C. Sexton,[13] of Rushville, Ind., recently reported a death following scopolamine-morphine injection. This patient, aged forty-seven, had been in poor health for five years, principally on account of excessive bleeding of the uterus from uterine fibroids. She was anæmic, poorly nourished, and weak. The heart was weak, but gave no murmur. The pulse rate was 100. She had a fair appetite, but feeble digestion, and was habitually constipated. The urine was normal. Her hemorrhage was distinctly menstrual, but had been excessive for five years. She received 10 grains of trional for sleep on two nights previous to operation. Her menstruation came on the night before operation; the flow was free but not alarming. Scopolamine, $\frac{1}{100}$ grain, and morphine, $\frac{1}{6}$ grain, were given hypodermically at 7.30 A.M. In fifteen minutes she was sound asleep. In thirty minutes she was completely unconscious, slightly cyanosed, pulse 120 and throbbing, respiration 20 but very shallow. Abdominal and intercostal muscle rigid; pupils contracted; jaw dropped backward; mouth open; eyeballs turned up. Both the heart and lungs were failing, stimulation and artificial respiration were vigorously applied, and the pupils dilated. One and one-half hours after the injection the respirations became very feeble and one and three-quarter hours after the injection the patient died, the heart con-

tinuing to beat after respiration ceased. The postmortem examination was superficially made and showed nothing of importance on naked-eye observation of the abdomen.

Sexton explains the death as due to acute cerebral anæmia produced (1) by the effect of the trional, (2) the effect of pelvic engorgement, (3) the effect of the drugs administered thus to a patient especially predisposed to it.

In four cases (those of Bakes, Landau, Sexton, and perhaps that of Flateau) the death of the patient seems to be so definitely connected with the administration of scopolamine and morphine that there is reason to believe that this anæsthetic had something to do with the deaths. Unfortunately we have no autopsy report from three of these cases, and in the fourth autopsy was incomplete. While this fact alone will cast lasting doubt upon the exact cause of death, it seems to me that if we have a mortality from this anæsthetic it is represented by these four cases.

The question remains as to how this narcosis has caused death in these cases, whether the dose of one or the other alkaloid, whether the combination of the two or the combination of one of these with chloroform and ether.

Scopolamine and hyoscine has not been looked upon as a highly toxic drug and is given with great frequency in the practice of medicine.

When injected in even large doses in my animal experiments over a considerable period of time it has not produced the slightest change in the well-being of the animals. They have eaten well and shown every evidence of perfect health. As has already been stated, however, many of these animals have developed degeneration in the parenchymatous organs.

Morphine, as is well known, acts favorably in single or repeated doses, both alone and in combination with the other anæsthetics except for the idiosyncrasies. As is well known, the life of the morphine habitue is not shortened, perhaps lengthened, by the use of this drug. When the two drugs are combined, however, in a dose too small to produce any

marked effect if used alone a deep sleep lasting for many hours with profound analgesia results. I am entirely unable to explain the powerful effects of this combination.

The results obtained by the combination of the two drugs are at the same time extremely variable in a fairly healthy human subject, much more variable in the diseased. Neurasthenics and nervous people as well as those suffering from disease of the heart muscle are particularly subject to its deleterious effects. This has been brought out by clinical experiments by Kochmann, who found that animals that had just recovered from an illness (flogging and acute lead poisoning) died from respiratory paralysis after a dose of $\frac{1}{10}$ gram of scopolamine, while a healthy animal was not affected by 1.5 g.

Kochmann believes that deaths are caused by a depression of the blood pressure through damage to the excitomotor apparatus of the heart. Landau explains all of the deaths as occurring from heart failure the result of profound alkaloidal toxæmia.

In a study of my clinical cases I have not found a severe reaction upon either the pulse or the heart in a considerable proportion of them. The pulse has been, as a rule, increased after the injection of scopolamine, but was usually of good quality throughout the operation, stimulation has not been needed in the further progress of the case, and pulse has gradually returned to normal within a period determined largely by the nature of the operative procedure. In two patients the pulse reached the rate of 150 per minute, in one case 160 per minute, but two of these were cases of extremely nervous boys who suffered extreme sepsis and whose pulse had ranged high previous to operation. The third patient suffered from fracture of the pelvis and ruptured urethra and entered the hospital with a pulse ranging from 120 to 130. In a majority of the cases the pulse ranged from 70 to 116, and was usually below 100 and of good quality.

The respirations have shown no noteworthy alterations

in our series of cases, but attention is called to the fact that the heart continued to beat after respiration had ceased both in Sexton's case and in Kochmann's animal experiments.

There is still another point of danger to be considered. Scopolamine often contains many isomeric bodies, some of which are very harmful, and it perhaps often happens that we not only do not obtain the physiologic antagonism which is expected from these two drugs, but the patient suffers from the poisonous effect of such bodies as atroscine. We are told that this is not to be avoided even with great care. This question of antagonism in the two drugs does not seem entirely clear. The collected experience would seem to indicate that when given alone these drugs are safe, but that when combined in even moderate pharmacopœial doses they may become dangerous.

A point of some importance in this connection is the demonstrated tendency of scopolamine to rapidly lose its power after it is placed in solution; indeed, we have noted a definite deterioration in crystals which were repeatedly exposed to air and light. A solution more than three days old should not be used.

Conclusions.—1. Scopolamine morphine narcosis is not devoid of danger.

2. The use of scopolamine and morphine alone for surgical narcosis is not justifiable and in my experience is not practicable.

3. A single dose two hours before operation lessens the discomforts attendant upon the operative procedure to a high degree and may obtain a definite place in surgical practice.

4. Four deaths have occurred in a series of two thousand four hundred cases, which have been so definitely related to the use of this method of narcosis that they may be called scopolamine deaths. This, however, in the absence of an autopsy demonstration.

5. These deaths have been reported as occurring with

a type picture of alkaloid poisoning and heart failure has been given as the direct cause of death (Landau).

6. A fatty degeneration of the liver and kidney has been produced by the use of repeated doses of scopolamine alone and of scopolamine in combination with morphine in animals.

7. This method of producing or assisting narcosis cannot yet be recommended for use in general practice in spite of the great advantage it seems to offer (Kochmann).

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SCOPOLAMINE-MORPHINE-ETHYL-CHLORIDE-ETHER ANÆSTHESIA.

By H. A. Royster, A.B., M.D.,
Raleigh, N. C.

Without attempting an exhaustive discussion of anæsthetics in general or championing any so-called ideal method of anæsthesia in particular, it is my purpose here to record some observations founded upon the use of the agents as outlined above in the title of this paper. It goes without saying that there is no safe anæsthetic. Any agent which produces unconsciousness cannot be devoid of danger. But if we are not able to remove the risk we may at least rob anæsthetics of much of their terror, banish many of their discomforts, minimize the quantity required, and reduce the time necessary for administering them.

During the past five months the method under consideration has been followed by me in about fifty cases, and while the total number is not large the results have been sufficient to justify me in reporting the results. I have read, I think, either in full or in abstract everything that has been written concerning these newer anæsthetic agents and their uses. I have observed various modifications used by different operators, and I have myself employed several plans now in vogue. To recite and to compare all of these would be time spent in useless rehash. Indeed, the whole inquiry would appear futile to many of you, who, I know, are using ether or chloroform with perfect satisfaction, as you have always done, and with these there should be no argument.

But of all the combinations suggested for aiding and abetting these agents, that which forms the subject of this paper, commended itself to me because I believe, first, that ether is our safest general anæsthetic; second, that ethyl chloride secures the pleasantest primary narcosis; and third, that the preliminary use of scopolamine with morphine increases the patient's mental resisting power and lessens the quantity of ether.

2. The old case of chloroform *versus* ether surely need not be opened again; it has been discussed and settled a thousand times and in a thousand different ways—and all of us still feel as we felt before. It is very much the same as membership in a church or a political party; we are prone to believe and to do what our predecessors or fathers believed and did. A most distinguished American surgeon once said to me, "The only difference between chloroform and ether is that when there is trouble with ether the patient has time to bid his friends good-by." At any rate, as long as ether is to be the one's routine anæsthetic, one should welcome any suggestion which seeks to do away with its chief objections, viz., distress in the primary stage and the length of time and large quantity required.

1. In my opinion there can be no question of the superiority of ethyl chloride over nitrous oxide gas as a preliminary to ether anæsthesia. Its action is more certain and constant and equally agreeable and I cannot help feeling that it is safer. Besides this, there is no need for complicated apparatus and expensive equipment, which sometimes will not work. If, however, one is prone to haul around forty dollar inhalers, the same ones can be utilized as for nitrous oxide. Since beginning this method, I find on questioning the patients that they never know when the ethyl chloride is suspended and the ether commenced.

3. The combination of morphine and scopolamine has recently excited much attention and comment. Under its influence alone many kinds of operations have been done.

My experience is confined solely to use of these drugs just prior to the administration of ether. Of those who have investigated scopolamine, some state that it is isomeric with hyoscine; others, that the effect in the combination is due largely to morphine; others still, that the drug is dangerous and uncertain in its action. I have made no tests other than clinical ones, and these have led me to conclude that scopolamine is not identical with hyoscine, that it does something more than morphine alone, and that it is safe in the proper doses. Never have I given more than a single dose of $\frac{1}{100}$ of a grain, but this has been repeatedly exhibited to patients of different ages, sizes, and conditions without any untoward results. Its most marked effects have been quieting of the nerves and fears, the promoting of an easy courage in beginning the anæsthetic, and a prolongation of the restful sleep afterward. Notable also is the fact that the quantity of ether has been with us reduced about one-third.

I have sought to use the simplest methods possible. At intervals varying from one-half to two hours before the time set for operation (one hour has been the average time) there is given a hypodermic injection of morphine, $\frac{1}{6}$ grain, and scopolamine, $\frac{1}{100}$ grain. When the patient is brought in for operation the ethyl chloride is first administered by spraying it on gauze folded in several layers over the nose and mouth. This requires on the average one minute to produce a primary anæsthesia. When this stage is complete, the cone saturated with ether is placed over the face and in four or five minutes more the patient is ready. In changing from ethyl chloride to ether there is occasionally a slight period of excitement, but it is always of short duration and in many cases does not occur at all. This combination, then, though it appears complicated and unnecessary, is really simple. It seeks to put the patient in a receptive mood for the anæsthetic, to induce narcosis gently, and finally to obtain a thorough anæsthesia under our most reliable general

anæsthetic. In other words, to translate rather freely a classic phrase, anæsthesia is produced safely, swiftly, and sweetly.

Finally, a note of warning should be sounded in regard to scopolamine. A few deaths have followed its use—even a single dose—and whether or not attributable to scopolamine, this is enough to make us feel that it is not harmless. Moreover, the appearance of the patient under its influence, associated with morphine has been such as to suggest alarming thoughts, and in two instances at least to cause my anæsthetizer to send for me hurriedly as he was starting to determine whether he should proceed. Perhaps this is due to the drug's normal physiological action, with which we are as yet unacquainted, or, in some instances, a danger signal with which we are unfamiliar.

DISCUSSION ON THE PAPERS OF DRS. WHITACRE AND ROYSTER.

Dr. F. W. Parham, of New Orleans.—I only want to say a few words with reference to the subject of anæsthesia, but not particularly with regard to scopolamine, as I have had absolutely no experience with that agent. I am rather indisposed to make any experiments with it until it has been more definitely demonstrated that there is no danger attending its use.

I am glad to see that the gentleman who read the first paper has shown that there is really some danger, and it will certainly make us more cautious in the use of these anæsthetics unnecessarily. I feel myself that ether, with the assistance, in some cases of one of the other anæsthetics, like ethyl chloride, is quite sufficient. The gentlemen are probably aware of the fact that in New Orleans we were rather disposed to use chloroform for many years. No one there for years used ether; but for the last two years ether has come into popularity owing to some accidents that have happened with chloroform. I remember seeing myself one winter four deaths from chloroform, and since that time I have been using almost exclusively ether, even in children. When one visits the Mayo clinic at Rochester,

Minnesota, for instance, and becomes aware of the fact that the anæsthetists there have given ether in over twelve thousand cases without any untoward accident, he feels almost convinced that ether is a safe anæsthetic. Certainly, it has not the quality of producing sudden deaths, as most of the deaths we have seen in New Orleans from chloroform have been produced. Whatever we may say of the Hyderabad commission regarding deaths through the respiration under chloroform, certainly some of them occur so rapidly that there is absolutely nothing to be done. The heart's action stops immediately. Some of these patients die while the operator is washing and preparing his hands for the operation in the other room. Some of them die before complete anæsthesia is brought about, or before they reach the operating-table.

The amount of ether used in the Charity Hospital, New Orleans, is very much more than formerly. I suppose we use more now in a year than we used in four or five years previously. I have seen elsewhere, as we have seen in New Orleans more frequently more or less disturbance on the part of the patient in giving ether. There has been a good deal of disturbance in many cases, and we have tried other means of making the anæsthetic more easily induced. Much of this difficulty is overcome as one becomes more skilful in the use of it. In some cases, the preliminary use of morphine hypodermically about half an hour before giving chloroform or ether will make the anæsthesia more easily induced, especially in alcoholics. The anæsthetic is taken much more easily and comfortably by the patient, and in every respect it adds to the advantages of the anæsthetic. In some cases I have used as a preliminary ethyl chloride. Ethyl chloride induces quick and easy anæsthesia, and you can carry the patient over into ether anæsthesia without any consciousness on his part of a change in the anæsthetic. It is of great advantage in some of these cases.

I cannot say anything, as I have remarked before, about scopolamine, but I can recommend heartily ethyl chloride as a preliminary to the induction of ether anæsthesia.

Dr. I. L. Watkins, of Montgomery, Ala.—The use of nitrous oxide gas and ether seems to be as perfect a combination of anæsthesia as we can get. It is satisfactory. The only objection is that the instrument is a little cumbersome to carry around.

Every practitioner cannot carry around with him one of these inhalers.

Dr. Parham referred to the large number of patients who had been anæsthetized in the Mayo clinic without accident. That is due to the fact that the same person has given the anæsthetics, and it means a great deal in the administration of anæsthetics. Whenever possible, one should have an expert anæsthetist. When gas is employed as a preliminary to the administration of ether there is less struggling on the part of the patient and less after-effects. Patients will lie down and go to sleep very easily when gas is given. Of course, sometimes we have seen patients struggle under the administration of any anæsthetic, but this is due more to their mental condition than to the anæsthetic itself. However, when one is thoroughly familiar with the administration of anæsthetics, there is no struggling on part of the patients. It is not disagreeable when you have someone who is accustomed to administering it. I have not had any experience with scopolamine as an anæsthetic, but a number of deaths have been reported from its use. The combination of gas and ether inhalations is decidedly more nearly perfect than anything I have heard of or am familiar with.

Dr. James B. Bullitt, of Louisville.—It would seem that the discussion has drifted a little from the subject of the papers. I take it, chloroform and ether are not on trial, but the question is whether or not scopolamine is dangerous, in the first place, and whether or not it is useful in the second place.

Dr. Whitacre, in speaking of the combination of scopolamine with morphine, followed by chloroform, has reported a number of deaths, some of which would seem to be attributable, in his estimation, and in the estimation of those who have made the reports, to the use of chloroform following the preliminary use of scopolamine-morphine. There was one death reported by Israel of a young woman upon whom the autopsy was made by Orth. The report was made by him that the degenerative changes found in the several organs were comparable to the degenerative changes found after acute phosphorus poisoning; and he stated in that report that in his experience these degenerative changes had never been witnessed by him after the use of chloroform by itself, and he was forced to the conclusion that they were the result of the combination of scopolamine and

morphine. In practically all of Israel's cases large doses were used. This method, it will be remembered, was introduced a number of years ago, and on account of the belief that it was dangerous, was abandoned practically for a number of years, and taken up again by its original introducer. But the amount of scopolamine and morphine was very much diminished, and in most of his cases this was afterward used in combination with one of the general anæsthetics, generally chloroform. The fact that the whole medical profession is willing and eager now to adopt new methods, to experiment with the new methods of anæsthesia, leads one immediately to the conclusion that the present and best methods of anæsthesia have not been wholly satisfactory. I believe that is the general experience of the profession with all of these methods that have not been satisfactory; yet, as Dr. Watkins mentioned, ether anæsthesia can be induced pleasantly in from three to eight minutes. Patients go into the operating-room, get on the operating-table, and are chloroformed while the surgeon is making preparations. The fact that ether has been administered to twelve thousand or thirteen thousand patients in the Mayo clinic without a death would lead one to suppose that some of our old anæsthetics are not only safe, if well administered, but extremely satisfactory. In our own experience these general anæsthetics have not been satisfactory; therefore, we experiment with a new form of anæsthetic. We have not had the courage to give scopolamine and morphine except where we have used it exclusively in conjunction with ether, and the results have been gratifying. The ether anæsthesia has been more agreeable. The patient has gone under it more rapidly, and the secretion of mucus in the throat has been markedly diminished. The anæsthetist himself is very much pleased with the combination, because it is more agreeable to him to give the anæsthetic. On two occasions we gave three injections of morphine and scopolamine, three, two, and one hours respectively, before the time of the operation. Neither of these patients was absolutely anæsthetized, yet one of them was sufficiently anæsthetized to permit the removal of a growth from the alveolar process without any special discomfort. This fellow was comfortable afterward; he had no ill-effects at all. A second case received, I believe, one sixty-sixth of a grain of scopolamine, and one-half grain of morphine, extending in this

way over three hours. He was somnolent at the time of operation, and was operated for the removal of a large prostate gland. The amount of blood lost was hardly sufficient to account for the collapse in this case, which occurred at the end of the operation. Before the patient could be removed to his room he went into profound collapse; the heart failed to respond to stimulation by salt solution, and the patient died five hours after the time of operation.

Dr. Edward H. Ochsner, of Chicago.—I believe that Dr. Watkins and Dr. Bullitt struck the keynote in their discussion of this subject. The trouble does not come so much from the anæsthetic as from the anæsthetist. If we would spend one-tenth of the time considering the anæsthetist that we have spent on discussing the anæsthetics, our results would be much better. The oldest anæsthetics are much better than they have been given credit for. That this is true has been amply proven at the Mayo clinic, where one anæsthetist has given over thirteen thousand anæsthetics without a death. This lack of mortality is due to the fact that they have competent anæsthetists. We must learn that the giving of an anæsthetic is as important work as that of the chief surgical nurse, and almost, if not quite as important, as that of the operator himself, and until we learn this we will not have solved the problem of anæsthetics. No one would think of pressing any undergraduate nurse or medical student into service as a surgical nurse, and yet this is just exactly what is done in most clinics with reference to the anæsthetist, and just as long as this condition of affairs obtains we will have deaths from anæsthetics which are wrongly ascribed to the anæsthetic employed. As soon as we get competent anæsthetists the number of deaths will be limited to a very small percentage and we will find that we will have little or no trouble from these agents.

Dr. Whitacre (closing the discussion on his part).—As Dr. Bullitt has said, I do not feel that this is a discussion on the relative merits of ether and chloroform.

Regarding the statement of Dr. Bullitt concerning the case of Israel I wish to state that the patient received a single dose of one-eightieth milligram of scopolamine, followed by six and one-quarter drachms of chloroform. Orth gave out the statement that this was a more extreme fatty degeneration of the liver than

he had ever seen resulting from chloroform intoxication and for this reason thought it must be due to the scopolamine. Other men have seen it. Other men have reported cases in which there was just such extreme degree of fatty degeneration after the use of six drachms of chloroform without any other anæsthetic. My case had six drachms.

I believe, and I think my belief is in harmony with the statement made by Dr. Ochsner, that too much experimenting is being done with general anæsthetics. I am a firm believer in ether alone as an anæsthetic, having been brought up in New York City, where only ether is given, and have always used ether anæsthesia. The preliminary reports of anæsthesia induced by the agents under discussion read like a fairy tale, and when the statement was made by men of authority that this drug was harmless, I felt justified in giving it a trial. I thought if it would ameliorate the discomforts of anæsthesia before and after operation, it would be a valuable addition to our existing anæsthetic means; but I by no means meant that we should abandon general anæsthetics. It was in this hope that I gave it a preliminary trial. While we had no serious results from its use, I felt that if it gave mortality in itself, even approaching that estimated, we were not justified in adding this danger to the possible mortality of existing methods. The object of my paper, was to give a rational basis of judgment for the deaths that have occurred after the use of this anæsthetic, to rule out unjust deaths and bring it down to those which cannot be explained in any other way. Personally, I feel that as long as there is a possible danger, a demonstrated danger, we are not justified in recommending scopolamine for general use.

Dr. Royster (closing).—I did not hear all of Dr. Whitacre's paper, but in the main I agree with his conclusions. I again assert with him that ether and chloroform are not on trial to-day. It seems, however, rather a reversal of the order for one who is north of Mason and Dixon's line, to read a paper on chloroform and one south of the line on ether. The chief advantage of scopolamine is in lessening the quantity of the anæsthetic, and in the greater ease of its induction. There is therefore no necessity for employing it with chloroform. I believe that in the future I shall depend more upon ethyl chloride for primary narcosis than upon any aid given by scopolamine. I have said

that I have seen no dangers from it, and I believe with care it ought to be safe. The death reported by Dr. Whitacre as occurring in the practice of Israel, in my opinion, was due to the intoxication by chloroform, and not so much to the scopolamine.

In regard to nitrous oxide gas, I still contend that it it not any more useful, and perhaps a little more dangerous, than ethyl chloride. Several cases of death from the administration of nitrous oxide are reported in the literature by dentists, and I have yet to hear of any death that could be attributed to primary narcosis by ethyl chloride.

Since coming to the meeting of this association, I spoke to Dr. Mayo in regard to scopolamine and asked him if he had used it. He told me that he had in a few cases, and had noted that appearance of the patients which I attempted to describe, namely, an expression rather startling or unpleasantly alarming, and that he had not been favorably impressed with it. As to whether that is a danger signal or not time alone will tell.

TWO CASES OF ANEURYSM.

One Popliteal, Treated by Intra-aneurysmal Suture of the Vessel Orifices According to the Method of Matas; the Other Involving the Second and Third Portions of the Left Subclavian, with Remarks.

By F. W. Parham,
New Orleans, La.

Case I. *Popliteal aneurysm of moderate size; opening of sac; suturing of proximal and distal openings of the artery; continuous suture from the lower opening to the upper without infolding of the sac.*—W. P. C., aged fifty-five years sent for me early in December, 1904. I found him complaining of pain in the leg, and examination revealed a pulsating tumor in the popliteal space. He gave the following history:

In August, 1904, while walking in the mountains of Kentucky, he stepped on a round stone, which turned under his foot. He felt some soreness in the leg that night. The next day there was some soreness in the knee and swelling of the ankle. One week later be felt numbness in the leg, and the legs seemed reversed. Several weeks later, weakness of the left limb was marked. A thumping began early in September, in the popliteal space, associated with some enlargement about the knee.

When I saw him in December there was no difficulty in making a diagnosis of aneurysm of the popliteal artery. He

was unwilling to undergo any treatment by flexion or by any other method that would keep him in an uncomfortable position for any length of time. He seemed, too, very averse to any operative intervention, but when I placed the matter clearly before him, he consented, and I sent him to the New Orleans Sanitarium, December 12, 1904. There was nothing noteworthy in the general condition, except that there was a distinct apical regurgitant murmur, of which he had been aware for a long time. The popliteal space, especially in its lower half, showed distinct pulsation, with expansion, but the tumor, while quite evident, did not show conspicuous bulging. December 13th, I operated upon him after the following manner:

The leg having been properly prepared up to the level of the ischial tuberosity, he was put under the anæsthetic, turned over on his abdomen, and an Esmarch bandage applied from the toes up to a point somewhat above the middle of the thigh, where the constrictor was fastened. The operation was then begun by making a long incision through the middle of the popliteal space, about over the centre of the aneurysm. Dissection was carefully made down to the aneurysmal sac, which was with difficulty brought into view, owing to its situation on the posteroexternal aspect of the artery, and also on account of four or five large turgid veins running directly over the sac. This was due to the fact that the constrictor had not been sufficiently tightly applied, and it had to be tightened up. This is mentioned specifically, as it seems to have some bearing on the subsequent suppuration. Several of these large veins had to be tied either by circular ligature or by lateral, and the aneurysm was finally reached and opened. A large amount of clot was turned out with the fingers, disclosing a rather irregularly shaped sac springing from the posteroexternal aspect of the artery and projecting chiefly anteriorly, the popliteal skin being only slightly bulged out. About three inches of the vessel wall seemed to be involved in the dilatation,

and about one half its circumference, leaving about one half the lumen presenting as a distinct trough, situated posteriorly and to the inner side of the sac proper, so that when the sac was laid open the cavity was seen to consist of two parts, the smaller lying posteriorly and to the inner side, and the larger, or aneurysmal sac proper, projecting anteriorly and to the outer side. The aneurysm was so overlaid by the tissues of the ham that this vascular groove was only discovered after a somewhat prolonged exploration of the sac. When found, it served as a guide to the upper and lower openings of the sac, which had for some time eluded a most careful search. The upper orifice was first sutured from within by chromic-gut sutures in a round needle, taking deep bites, and then the lower opening in the same manner. Finally, a continued chromic-gut suture was carried from the lower opening to the upper, about three inches, converting this practically into fibrous cord, thus thoroughly obliterating it. The sac could not be closed by Lembert-like inversion sutures, owing to its being so deeply imbedded and firmly adherent to the surrounding tissues, so I could only place a deep drain of gauze and depend upon such approximation as could be effected by the superficial sutures and a large dressing snugly bandaged on a posterior pasteboard splint. When the constrictor was released there was considerable venous hemorrhage, which was controlled by a number of ligatures. The wound was sutured completely, except where the drain came through, and a large dressing enveloping the whole extremity from toes to groin, was applied. A few days after the operation the drain was removed and the dressing reapplied. All went well without any constitutional evidence of any local sepsis for about a week following the operation, when I dressed the wound, merely to see how it was getting along. I found it had opened, and a considerable quantity of pus was discharged. I opened the wound more freely so as to pack it with iodoform gauze, and continued to do this for some days.

On January 9th he left the Sanitarium for his home, in very good general condition, with the wound discharging very little, though still open. I continued to dress him for a few weeks longer—until the wound was entirely healed.

May 16th he visited my office, in excellent condition, with no evidence of return of the aneurysmal pulsation. Some pulsation could be felt at the upper part of the popliteal space, but this was clearly nothing more than the pulsation of the artery above the aneurysm. The dorsalis pedis artery could be quite distinctly felt. The posterior tibial could not be made out at all.

Since writing the above, this gentleman has died in Kentucky, but I have as yet been unable to get particulars, although I have reason to believe from conversation with a friend of his previous to his death that the aneurysmal tumor had not recurred.

Case II. *Aneurysm of the second and third portions of the left subclavian, beginning just behind the scalenus muscle, and extending to the point of disappearance of the artery under the clavicle, the outer half of which overlay it somewhat. Resection of the inner three-fourths of the clavicle; ligature of the first portion, just inside the scalenus muscle; temporary cessation of the pulsation; incision of the sac, followed by severe hemorrhage; finally controlled by suture of the proximal opening within the sac and distal ligation of the subclavian.*—This case I report with the kind permission of Dr. E. D. Martin, who operated upon it, assisted by myself.

This case was that of a man aged fifty-three years, troubled with a tumor just above the middle of the left clavicle, which had been growing since the middle of September, 1904, causing him much pain in that region and in the arm, and disabling the use of the arm.

No difficulty was had in making a diagnosis of aneurysm of the subclavian, probably near the beginning of its third portion.

Operation was done December 8, 1904, by Dr. E. D. Martin, assisted by myself. An L-shaped flap, marked out by an incision down the outer border of the sterno-cleidomastoid to the sternal end of the clavicle and thence along the clavicle to the acromion, was turned outward and the inner two thirds of the clavicle removed. The remainder of the clavicle was subsequently removed to gain more room, owing to the projection of the aneurysm under this bone. The artery was then sought for by careful dissection, necessitating, finally, the cutting of the scalenus anticus before the vessel could be sufficiently isolated above the sac to permit of its ligation. This was successfully done by Dr. Martin, but the pulsation continued, whereupon he threw a second ligature about the vessel, close to the first and nearer the aneurysmal sac. This seeming to control the pulsation, I suggested laying open the sac, which Dr. Martin did. At once there was a gush of blood, which was largely controlled by my finger, thrust into the opening of the subclavian in the sac. Dr. Martin grasped the artery outside the sac between thumb and finger, whilst with the other hand he managed to get another ligature about the vessel, close to the sac. This being tied, the bleeding was much diminished, but still continued, and could be seen pouring into the sac when my finger was withdrawn. At this juncture we concluded to suture the plainly exposed orifice, which was large enough to admit the index finger. This was easily done, and at once controlled absolutely the proximal bleeding. Considerable hemorrhage however, continued to come from the distal end of the artery, probably supplied through the subscapular from its collateral connections above. This Dr. Martin secured after much difficult and anxious dissection, owing to the encroachment on the region by the sac and the extensive infiltration of the surrounding tissues. When this was accomplished, all bleeding ceased, the wound was sutured, with provision for drainage, and he was put to

bed in fairly good condition, notwithstanding the considerable loss of blood he had sustained. I took charge of the patient while Dr. Martin attended the meeting of this association in Birmingham. Nothing eventful occurred until some time later, when Dr. Martin found an abscess in the region of the old sac. This was evacuated, and healing of the wound took place without further trouble. No hemorrhage and no gangrene occurred, save a small pressure-sore over the olecranon, but marked disability continued, which was, however, considerably improved under careful electrical treatment. He came to my office in September, in good spirits, telling me he was steadily getting better. He has continued to improve to this date.

In this case the method of Matas was not typically carried out, in that only the proximal opening was sutured, the distal not being found, so that the artery below had to be ligated, but the effect of suture in controlling the hemorrhage which the proximal ligation had failed to do satisfactorily, was beautiful and striking. There seemed to be some vessel bringing a retrograde current into the artery so close to the aneurysmal sac that the ligature did not control it, whereas the suture did.

In another case, I would put a clamp on the vessel, close to the sac, open the sac and suture, and if the distal opening could not be similarly treated, I would as Dr. Martin did in this case, ligate the exposed distal vessel.

Here, then, are two cases of markedly different character, in which the demonstration has been made by us that intra-aneurysmal suture of the feeding orifices is effective in controlling the bleeding and curing the aneurysm without the occurrence of secondary hemorrhage or of gangrene.

In devising this operation and so clearly marking out its indications and its technique, Dr. Matas has done a most brilliant piece of work, which is, without doubt, one of the most valuable contributions to surgery of recent years. It is far more rational than the Anel-Hunter method, and

far safer and more effective than that of Antyllus or any of its modifications. The Hunterian operation first done by Hunter on December 12, 1785, just 120 years ago yesterday, was a reaction from the terrible results of the Antyllian procedure. Indeed, as Mr. Holmes points out (Stimson), "the immediate acceptance and substitution of the Hunterian operation, which was of itself nearly as fatal as amputation of the thigh shows that the mortality after the old operation must have been frightful."

The lack of anæsthesia, ignorance of asepsis, imperfect hæmostasis, partly due to the hurry incident to operation without anæsthesia, and consequent shock, will explain the immediate large mortality, and the sepsis and general imflammatory infiltration and tension favored the occurrence of gangrene and secondary hemorrhage. Undoubtedly, under such circumstances, the ligation of an easily uncovered portion of artery higher in the limb seemed a much more sensible surgical procedure, and Hunter's example had many followers. But some of the prominent surgeons, like Syme, still preferred the old operation in certain cases, reserving the Hunterian for popliteal, femoral, and carotid arteries.

Sepsis, secondary hemorrhage, and death, or gangrene, requiring amputation, adding perhaps to the fatality of the operation, attended both the old and new operations until the advent of the antiseptic era, when the mortality from both operations fell in a remarkable manner, as shown by the statistics of Delbet. With the improvement in technique and the avoidance of sepsis, the old operation again came into favor.

The extirpation of the sac, which controlled the bleeding from collateral supply to its walls enabled the surgeon to do away with the tight packing of the sac, and the results were much improved. Still, gangrene occasionally supervened, and death or amputation was the end.

The discussion on Popliteal Aneurysm in the Société

de Chirurgie of Paris last spring shows still great diversity of opinion, owing to varying results in the hands of equally good surgeons.

One thought simple ligation much less likely, in large aneurisms, to be followed by gangrene, while another, held that the extirpation of the sac was distinctly safer. Most were agreed that the Esmarch bandage should be discarded, as adding to the danger of gangrene. Some were of opinion that the distal ligation should be done first, to prevent the distribution of clots in the vessels of the leg below the aneurism, while one (Poirier) reported one case of extirpation of the sac where the distal ligation was first done, but was followed, nevertheless, by gangrene. He suggested that in arteriosclerotic patients with voluminous aneurysm (popliteal), simple ligation should first be resorted to.

Now, I believe that intra-aneurysmal suture of the openings after thorough emptying of the sac, will be far safer than any of the modifications of the old operation, because the intra-aneurysmal pressure is relieved by the removal of the clot, and because the suture of the very *ends* of the arteries —their mouths in the sac—saves every possible fraction of an inch of the nutrient vessels, both direct and collateral. Besides, suture of the openings, while effective in controlling hemorrhage, does it by simple approximation, and therefore with less damage to the vessel wall. Futhermore, to get a ligature around the vessel requires more dissection and more interference with collateral supply, especially with that which lies close to the sac. The method is applicable to all aneurysms where the proximal current may be arrested with constrictor or clamp or temporary ligature, and where the interior of the sac may be inspected through an incision.

While I do not believe that many cases of fusiform aneurysm will be found where it will be a distinct advantage to attempt to restore the continuity of the artery, still, a few cases like Morris' may justify the attempt. But there

is so little interference with collateral supply by this method of Matas, that I believe it will be safe in almost every case to resort to simple suture of the arterial openings, which is the essential feature of the operation.

The experience of the past two years—it has been on trial only two and one-half years—in the twenty-five cases, including case No. 2, here reported, and not comprised in the twenty-four cases collected by Dr. Matas (soon to be published by him), so far reported, either in the journals, or personally to Dr. Matas, indicates, and wider employment of the method in the future will, I believe, demonstrate, that the only contraindication to simple suture of accessible vessel-mouths will lie in the largest vessels, especially the aorta, where simple ligation has been uniformly fatal.

I believe the Matas procedure of *reconstruction* of the aorta affords the only hope for these cases, where the methods by coagulating injections, introduction of solid bodies, or galvanopuncture have heretofore been our only resort. The method in some cases can be easily carried out, where erosion of the vertebræ has not occurred, and the sac can be sufficiently cleared of adherent viscera to afford entrance by incision. Many surgeons are doubtless awaiting such an opportunity, and the next few years will probably demonstrate the feasibility of the operation in some hitherto hopeless cases.

It was not my intention in writing this paper to go into the subject in anything like an exhaustive manner, as Dr. Matas has done that most thoroughly in the paper which I hold in my hand, just received from him, so I will close this paper with the following summary of conclusions:

Summary of Conclusions. The operative indications for this procedure are:

1. The practicability of laying open and inspecting the interior of the sac; and

2. The possibility of applying a constrictor, clamp, or temporary ligature to the proximal side of the tumor.[1]

In the second case reported, the suture was employed because proximal ligature failed to stop the bleeding completely.

The operation of suture within the sac is to be preferred to ligature, because—

1. Every possible bit of artery is saved, except that actually forming the sac of the aneurysm.

2. Suture accomplishes simple approximation of the intima, and does not cut through, as may happen with ligature of an atheromatous artery.

3. All collateral bleeding in the sac is stopped by direct suture of these vessel-mouths within the sac and packing of the sac becomes unnecessary.

4. Hence there is no disruption of the outside vascular (collateral) connections of the sac-wall, already much relieved by the emptying of the sac.

The reconstruction of the artery is to be attempted only in certain cases, as in aortic aneurysm, where suture of the proximal opening would, like ligature, probably be fatal, and in other aneurysms, where, from swelling due to lymphangitis, etc., as in Morris' case the danger of gangrene is too great to risk any interference with the nutrient stream. In such case, and especially the latter, the reconstruction of the artery is to be preferred, for two reasons:

1. Because even a temporary continuance of the main stream will be a great advantage until the subsidence of œdema consequent upon the evacuation of the sac shall have somewhat relieved the stress upon the collateral vessels; and

2. Because, as remarked by Matas, and shown in Danna's

[1] Distal compression is not mentioned, as it is believed that with proximal control the distal opening may be sutured first, before blood shall have had time to return in a retrograde manner. The range of applicability of the procedure is thus somewhat extended.

case, it is feasible at a secondary operation again to open the sac and close the arterial openings.

In some abdominal aneurysms, hopeless by other means of treatment, Matas' method offers some hope of cure.

DISCUSSION.

Dr. Robert T. Morris, of New York City.—This brilliant new work is very fascinating, and I am surprised that more have not taken it up. It certainly promises very much for our aneurysmal cases, and I have very much hope that we can have some of the aneurysms that ought to be turned over to us for treatment by this method.

The method is based upon our knowledge of the fact that endothelial surfaces opposed become united by plastic exudate or lymph, and the replacement of lymph by new endothelial cells. We know how this occurs in the peritoneum, and we now know that the same thing occurs with the tunica intima of the arteries, so that if a large artery is sutured in such a way as to bring the endothelial surfaces together, the margins of the tunica together we may expect union, the same as we would expect two folds of peritoneum to unite under the same circumstances.

In a case of large fusiform aneurysm of the knee, the aneurysm being so large that when the patient is standing the pulsations could be seen on either side of the knee, I laid it open in the middle and turned out a number of clots, and then with a chromic gut suture, made a new artery; that is, I reached down to the bottom of this great aneurysm, made a new artery, continuous with the normal artery above and below, and then, in taking off the constricting bandage, watched with considerable interest, to see if it leaked. The patient was a very large man, with a very large artery, with a large heart, a tremendous pump at work, and when the blood pounded through that artery there was no leakage. That was intensely interesting. The whole thing united by primary union, and the enormous infiltration of the leg began to disappear; in a short time, the man was beginning to walk and use the leg, and the thing went on to repair by primary union. It relapsed, three months afterward, and the man began to have another aneurysm at that point. It was due

to my not having had sufficient experience in this work to properly gauge the lumen of the artery, and it may be I was a little too lax at one small point, and at that point a new aneurysm began, and when I was called again to see the patient, six months afterwards, I said to the man, I want to try this over again, as I believe we can cure the aneurysm by restoring that weak point. The man was an ignorant fellow, and he said, "No, I want you to cut my leg off; I don't want any more experiments." I had in this case, as in all others, explained to the patient that it was experimental, and he was a little suspicious of any experimental work in the first place. When I proposed further experimental work, he said, "Cut my leg off," and insisted, and I am sorry I had to yield. I amputated the leg.

I intended to bring the specimen here to show at what a small point a new aneurysm began, and what fair probability of success we might have in restoring the continuity of that artery.

Dr. Waller O. Bullock, of Lexington.—In April, 1903, before the Kentucky State Medical Society, I read the report of a case of large traumatic aneurysm treated by the method of Matas. This was a very large aneurysm, about the size of a cocoanut. The technique, as recommended by Matas, was applicable in the minutest detail to this case. The clot was turned out; the openings of the vessel were closed, and the walls of the sac were approximated according to the directions laid down by Dr. Matas.

In July of last year I had my second case of aneurysm treated by this method. The patient was a man, fifty years old, whom I had seen a year and a half before. He refused operation the first time, but on account of pain, finally consented to operation. He had been working in a tin store and subjected to severe strain. The aneurysm was a fusiform popliteal aneurysm. The measurements were four and one-half to five inches in length, and about three inches in breadth. It developed toward the bone, and when I opened the sac to occlude the openings of the vessels, I found the mouths of the vessels much nearer the posterior than anterior surface, and besides, they lay upon the outer wall of the sac. They were closed, however, without any difficulty, and the walls of the sac were opposed by side to side sutures. No retention stitches were needed

in this case. In my third case which I operated on a month later the aneurysm was smaller; it developed in a man of about thirty-four years who gave a former history of syphilis. The conditions were similar to those in the last case with the exception of the size of the aneurysm measuring only about three inches. As in the former instance it developed forward instead of backward. The openings of the papliteal artery were found on the inner wall of the sac instead of the outer wall. The same technique was carried out with the exception I used three retention sutures on the side opposite to that on which the vessels lay. In all three cases the tourniquet was applied. In my second case when I opened the sac, there was profuse hemorrhage from the mouths of the vessel. My assistant at once put his fingers upon the mouths of the vessel and closed them. In the meantime I got down the tube of an irrigator that was standing near and wrapped it around the man's leg. I then immersed my hands for a minute or two in bichloride solution but did not disinfect them, and went ahead with the work. In consequence, I got infection of the sac, and in two days the man's temperature was 104. I opened the sac and drained it freely; after opening the sac the suppuration rapidly subsided, and in three weeks time there was nothing except a granulating surface, flush with the skin. In only one of these cases, the last one, was there any interference with the circulation in the leg and foot. In this case there was a little swelling which required a bandage for a short time.

A year ago the first patient I operated on was still alive. The other two patients are alive. I do not know whether the first one is still living or not. There was no recurrence in any of these cases.

THE SURGICAL TREATMENT OF FLOATING KIDNEY.

DESCRIPTION OF OPERATION. REPORT OF CASES.

By Floyd W. McRae, M.D.,
Atlanta, Ga.

At the meeting of this Association in Atlanta, 1900, I reported two cases of combined appendectomy and nephropexy through the same incision, abdominal. Both these cases have remained "cured."

Later, Pryor, of New York, reported a series of combined operations, through a lumbar incision, giving me full credit for my work.

I was not satisfied with any of the operations then being performed. I felt that sutures through the capsule, in situ, including the substance of the kidney, were wrong and that such operations must eventuate in many failures. The opportunity to observe some such failures has accentuated my feeling against this class of operations.

A review of the literature of floating kidney reveals the greatest diversity of opinion, surgeons recommending various operative procedures, many physicians arguing against all operations and recommending impossible bandages that only exceptional patients of great endurance and unlimited perseverance ever learn to wear with even a degree of comfort.

Evidence of unquestioned character is constantly accumulating in favor of surgical intervention in properly selected cases.

Undoubtedly many incomplete cures are due to failure on the part of the operator to recognize and correct associated pathological conditions.

The operations suggested and done by Henry Morris, Mayo Robson, Senn, Ferguson, Edebohls, Goelet, Newman, Bechett, Dorsett, Arbuthnot Lane, Guitéras, with various modifications by many surgeons, have been curative in a majority of suitable cases.

Fewer failures will follow as the cases for operation are selected with more care and the technique of the operation is improved. I have gotten some good results by several methods, but not so uniformly, or so good, as to in a measure satisfy me until I worked out the operation about to be described.

Reference to the accompanying description, photographs, and drawings will show that the tissues are conserved with great care.

One of the most annoying post-operative complications is a persistent neuralgia, which affection I am sure is unusually, if not always, due to injury to the iliohypogastric and ilioinguinal nerves, which cross the field of operation. These nerves are often cut, or included in the sutures. They can, however, be avoided by a little watchful care.

The patient is placed in a modified Sims position, resting on a sand-bag or an Edebohls cushion to increase the space between the last rib and iliac crest. An incision is made beginning just back of anterior border of erector spinæ, immediately below the twelfth rib, extending obliquely to about one inch behind the anterior superior iliac spine, down to the deep fascia. A short cut one and one-half to two inches long is next made, in the same direction beginning just over the anterior border of erector spinæ, through the fibres of the latissimus dorsi.

The deep, lumbar, and transversalis fasciæ are cut directly downward to the iliac crest. The latissimus dorsi, the erector spinæ, and the quadratus lumborum are pulled backward,

the abdominal obliques and transversalis forward. To this point the operation is similar to the muscle splitting operation of Mayo Robson.

This freely exposes the fat and the iliohypogastric and ilioinguinal nerves, as shown in accompanying illustration. These nerves are pushed aside and the kidney delivered between them by forceps traction on the fatty capsule, without handling or trauma.

A flap of the fibrous capsule about $1\frac{1}{2}$ x $1\frac{1}{2}$ inches is next raised from the posterior surface of the kidney, beginning just in front of the hilum, separated from the cortex by careful dissection to the convex border of the kidney. The capsule is incised along the convex border of either pole of the kidney, reflected toward the hilum, thus completely exposing the posterior surface of the organ.

Two mattress sutures are next inserted, somewhat similar to the method of Bradle through capsule just in front of the hilum including the reflected flaps. (See Fig. 4.) These sutures, with the suspensory ligament made from the reflected posterior fibrous capsule, hold the kidney high up, well back in the hollow of the loin, nearer in its normal position than any operation I have done, or with which I am familiar.

The fatty capsule pushed in front acts as a protecting cushion. The raw posterior surface adheres firmly. The kidney is next replaced, the mattress catgut sutures passed deeply through the posterior muscles, in front of the ilioinguinal nerve and tied over muscles but underneath fat and skin. A heavy catgut suture is next passed through each angle of the flap (suspensory ligament) so as to approximate the separated muscles and cut fasciæ. A cigarette drain is placed between these sutures to the raw surface of the kidney. The muscles and fasciæ are accurately closed with catgut, above and below these sutures. The skin and superficial fat are accurately approximated by interrupted silkworm-gut sutures, with a needle on each end, passed from

within out, each suture taking a good bite of deep fascia and muscles.

A few catgut sutures are put between the silkworm-gut sutures where necessary to approximate the skin.

The wound is dressed with gauze wrung out of hot salt solution and absorbent cotton, held smoothly in place by broad adhesive strips, with an abdominal binder over all.

The dressing is changed daily, until the drain is removed, usually in twenty-four or forty-eight hours, according to amount and character of drainage.

After the drain is removed a dry sterile dressing is put on and allowed to remain until time to remove sutures, seventh to ninth day.

The patient is kept on back or operated side for two weeks and in bed for three to four weeks.

A well-fitted abdominal supporter, properly padded is recommended to be worn, from three to six months. It is a valuable adjunct to the operation. The supporter tends to correct any coexisting enteroptosis, inspires confidence, and makes it difficult to wear a tight corset.

No operation that I perform gives more gratifying results than does anchoring a kidney as above described.

The cases herein reported show other pathological conditions corrected at the same seance, *e. g.*, chronic appendicitis, Cases I, II, IV, IX, X, XII, XIII, XIV, XVI, XVII, and XVIII.

In Case IV the movable kidney might have been overlooked when appendix was removed the preceding July.

In Case XIX, I removed the appendix two years previously, but while the floating kidney was recognized the patient's condition under the anæsthetic was such as to make prolongation of anæsthesia hazardous.

The frequent association of floating kidney and chronic appendicitis as pointed out by Dr. Geo. Ben Johnston and others is corroborated by my experience.

Case I. (Transitional).—Mrs. A. J. J., aged fifty-six years,

mother of seven children. For five or six years she has had a decided dragging in the right side of back, and tight clothing was uncomfortable. Since December, 1902, has not been able to be on feet much on account of attacks of "catching" in right side of back, admitted to St. Joseph's, May 7, 1903.

Operation, May 10, 1903, by Dr. A. Hugh Ferguson, when kidney was delivered by traction upon renal fat and cellular tissue. Fat then pushed in front of kidney; kidney decapsulated and punctured. A whip-stitch was then placed through each side of capsule; brought through muscles and tied at upper angle of the wound. A transverse strip of muscle was now cut at the iliac crest and sutured to the lower end of the kidney. A strip of plain gauze carried down to the kidney substance and the wound closed with silkworm-gut.

Case II. (Transitional).—Mrs. M. M. D., aged fifty years. At birth of last child, twenty-two years ago, was given a great deal of ergot, and was in bed for eighteen months. Long-continued local treatment for some uterine displacement. Menopause two years ago, since then she has had considerable dragging in back, especially after walking or working, and has had much mental worry. Admitted to St. Joseph's May 28, 1903. Right floating kidney; a retrodisplaced and fixed uterus, and considerable mental derangement.

Operation, June 1, gas-ether. Nephropexy; oblique incision; kidney delivered by Ferguson method; decapsulated; fat pushed in front of kidney; whip-stitch on each side of capsule and fastened to the upper angle of the wound. Cigarette drain to kidney; catgut closure of the muscles, with silkworm-gut through and through. Laparotomy; uterus freed from adhesions and stitched to anterior abdominal wall. Result good. Not heard from recently.

Case III. (Transitional).—Mrs. C. P., aged thirty-five years. For fifteen or sixteen years has suffered with repeated aching and pain just external to the gall-bladder region. Has had stomach and liver treatment of various kinds, but only

getting temporary relief. Overeating or undue exercise always caused the pain. Has been in bed for six months; sitting caused a dragging in back, and walking gave her decided pain. Admitted to Baptist Tabernacle Infirmary, September 22, 1903.

Operation, September 23d, gas-ether. Oblique incision and Ferguson delivery of kidney; a flap $1\frac{1}{2}$ x 1 inch elevated from posterior surface of capsule, and an incision of capsule made along convex border of the kidney. Posterior cut edge of capsule suture to under surface of muscles; anterior flap sutured between muscular lips, and a kangaroo tendon suture passed through each end of the kidney and muscular wound edges. A cigarette drain was introduced and the wound closed with silkworm-gut sutures. Appendectomy; McBurney gridiron, which had to be enlarged upward as only transverse colon could be found in wound. The cæcum and the appendix, bound up in adhesions, were found under the liver. Result, excellent.

Case I. (Modern operation).—Mrs. J. W. R., aged thirty-four years, admitted to St. Joseph's, January 4, 1904, with the following history: usual diseases of childhood; always suffered from dysmenorrhœa; only child now eleven years old; she did not menstruate for two years after its birth; took local treatment a year ago; suffers from nervous headaches. Two months ago she was taken with general abdominal pain, worse over the appendix; this relieved in twenty-four hours, when she got up, but soreness remained for four or five days. Twelve days later she had a similar attack that kept her in bed for four days from soreness, although the pain only lasted for four hours. Four weeks ago she had a similar attack, and remained in bed until brought to the Infirmary.

Operation, January 5, 1904, gas-ether. Oblique incision made over right kidney, and kidney, which was near umbilicus, was brought out of the wound by Ferguson method; kidney very large with marked adhesions. After the fat was pushed

back in front of the kidney, a flap 1½ x 1½ inches was cut from the posterior surface of the capsule, with its base just at the anterior surface and outer border of the kidney. An incision was now made along the outer border of the kidney and the capsule reflected on each side, posteriorly to the cut edge for flap. A mattress suture now being placed in each angle of this posterior cut surface (from whence the anterior flap was cut) and the loosened capsule, and the kidney returned to position, it was held snugly against the muscular wall when the sutures were passed and tied. The muscles were now closed with No. 2 plain catgut sutures, and the anterior flap being fixed between them by two muscular sutures passed through its angles. A cigarette drain was now introduced along this flap to the raw surface of the kidney, and the skin wound closed by a few silkworm-gut and catgut sutures. Appendectomy; a small gridiron incision made, and the appendix, with its distal end enlarged and thickened, with adhesion over appendix and cæcum, was easily found and amputated by the Doyen method. Abdomen closed in layers with catgut. Restoration to health complete, and continues to date.

Case II. (Modern operation).—Mrs. J. C. H., aged thirty-six years, admitted to St. Joseph's, January 13, 1904, with the following history: operation one year ago for lacerated cervix and hemorrhoids. One year after her first child (ten years ago) she had an attack of violent pain, like colic, in the right side of the abdomen, when a "lump" was also found in the right side, "which the doctor said was a tubal abscess that later discharged through a pregnant uterus;" since then she has had almost constant backache; felt the tumor inside at times, and had similar attacks of pain, which she took to be ovarian, but she was conscious of two distinct kinds of pain. Never vomited. Had nausea. Has not been able to walk much without pain for years, and riding was torture.

Operation, January 14, 1904, gas-ether. Nephropexy,

as in Case I. Appendectomy; gridiron incision; appendix found covered with adhesions in the pelvis, and stitched near its base. Doyen amputation and layer closure. Home, January 29th. Patient in my office a few days ago and is in excellent health. Has gained many pounds in weight and is free from old aches and pains.

Case III. (Modern operation).—Mrs. W. A. P., aged fifty years, admitted to St. Joseph's, January 22, 1904, with the following history: trachelorrhaphy and perineorrhaphy done May, 1903. In July, 1903, she received a fall from which she suffered six hours; since then she has suffered almost constant aching in the region of the right kidney, that is increased while walking and only relieved when she rests at night.

Operation, January 23, 1904, gas-ether. Nephropexy, as in Case I. Home February 3d. Complete relief on right side, but had a fall and displaced left kidney. Have not been able to trace recently.

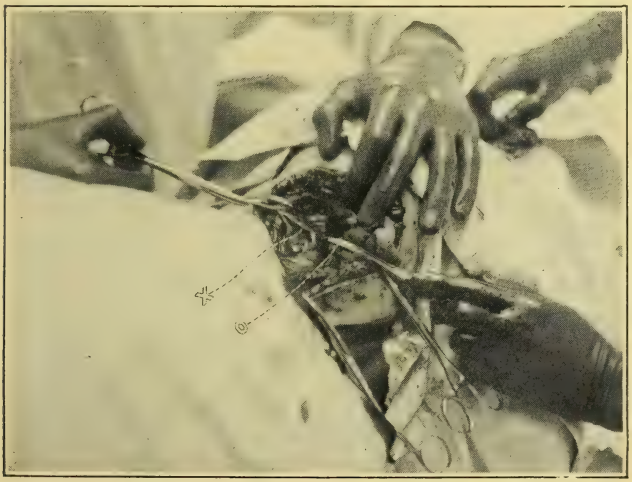
Case IV. (Modern operation).—Mrs. D. R. W., aged thirty-two years, admitted to The Halcyon, with the following history: Operation, January, 1900, when left pyosalpinx removed and many intestinal adhesions relieved. After this, she regained her health rapidly for three months, when she caught a cold and had a prolonged cough—tuberculosis being suspected—after throat treatment this became all right. For past two or three years she has been having pain in region of right kidney, lasting for two or three days at a time. During the past year has had almost constant aching. During the past three months has often found the kidney about umbilicus, and would push it back into place. When it was out of place she would be very nervous and get deathly sick. For the past two years she has eaten very little food, the smallest amount causing pain under the right border of ribs. During the past few months she has passed pus from the bladder several times.

Operation, March 29, 1904, chloroform. Nephropexy, as in the above cases. Kidney hard to deliver on account

Fig. 1.

Oblique incision from junction of the twelfth rib and erector spinæ muscle to about one inch posterior to anterior superior spine of ilium, only the anterior fibres of the latissimus dorsi muscle and the lumbar aponeurosis and fascia transversalis being cut, the posterior portion of the latissimus dorsi, the erector spinæ, and the quadratus lumborum muscles being drawn backward, and the abdominal obliques forward, going down through the triangle of Petit.

Fig. 2.

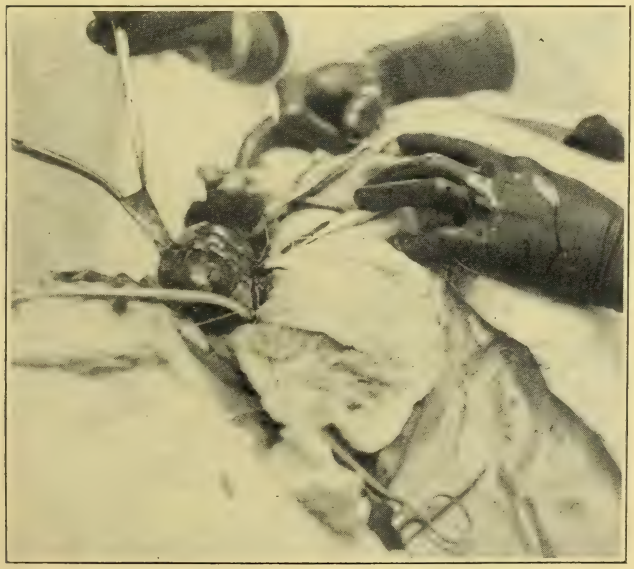


Showing the iliohypogastric nerve, *x*, on end of forceps and drawn forward, *o* representing the ilioinguinal nerve crossing quadratus lumborum muscle; kidney is delivered between these nerves, which are also protected during suturing.

Fig. 3.

Kidney being delivered by traction on the fat and cellular tissue by successively catching with a good sized forceps or small clamp, the kidney not being pressed upon or handled.

Fig. 4.



Showing flap, one and a half inches square, cut from the posterior surface of the capsule and turned forward; mattress sutures placed through angles or above cut surface, and base of reflected posterior capsule ready to be sutured to the under surface of the muscles; also forceps holding capsule, which is reflected to near hilum of the kidney.

FIG. 5.

Kidney replaced, posterior sutures tied, and forceps attached; the anterior flap is between lips of the wound, with muscular sutures, *a*, through each angle. A cigarette drain is placed along the posterior surface of this flap to the raw surface of the kidney.

FIG. 6.

Skin wound closed with silkworm gut, and catgut sutures with a needle on each end, passed from within outward; cigarette drain shown near middle of the wound.

of the small space between ribs and crest of ilium; marked adhesions. Appendectomy; gridiron incision made, but had to be enlarged upward on account of cæcum and chronically diseased appendix being under border of the liver. Home, May 1st. Good health. Examined within the past ten days. Kidney in normal position and free from tenderness.

Case V.—Mrs. J. L. D., aged twenty-seven years, admitted to St. Joseph's, March 20, 1904, with the following history: Operation, July, 1903, for appendicitis; having had attacks of abdominal pain during the previous year. She suffered with great pain in the right kidney for two days following the operation for appendicitis. Was then perfectly comfortable for two months, when she suffered from stone passing from right kidney to bladder. Never free from pain thereafter. During the past month has had frequent sharp pain in right kidney with frequent and painful urination. Urine has contained a varying amount of pus, blood, and adrenal epithelium. Bladder was irrigated, now and then, with saline and adrenalin solution and she became practically easy.

Operation, April 6, 1904, kelene-ether anæsthesia. Nephropexy, as in Case I. Kidney not completely delivered on account of marked adhesions, friable capsule, and a state of spasm of the muscles that was maintained throughout the operation. Trachelorrhaphy. Complete relief from kidney and digestive disturbances. General health good.

Case VI.—Mrs. N. McQ., aged fifty years, admitted to St. Joseph's, September 3, 1904, with the following history; malarial fever when she was thirty; mother of five children, and was lacerated and torn with the first. After the third child (twenty-two years ago) she was in poor health for a year; ten years ago, after the birth of the last child, she was in bed several weeks with jaundice and puerperal fever; previous to five years ago she was subject to "cramp colic;" this spring and summer she has had "a general run-down feeling," backache, leucorrhœa, nervous, and when she wakes in the morning does not feel rested.

Operation, September 8, gas-ether. Perineorrhaphy and nephropexy, as in Case I. Kidney delivered easily; capsule adherent in places. (No. 1 chromic catgut used in this operation, kangaroo tendon having been used in the others.) Condition good when last heard from, two months after operation.

Case VII.—Mrs. M. K., operation, Grady Hospital, September 21, 1903, right femoral herniotomy (silver filigree used), and right nephropexy with delivery, flap, and suturing as in the previous cases. Lost sight of.

Case VIII.—Mrs. J. O. G., aged thirty-four years, admitted to St. Joseph's, October 24, 1904, with the following history: Had to stop school when eighteen, on account of anæmia and nervousness; regained strength after two years. Long labor with first child, eleven years ago, and regained strength slowly; eighteen months later was lacerated and torn; during third pregnancy she had extreme nausea, and pain in uterus for three months; two miscarriages followed. Came very near dying in spring of 1903, from dysentery. For the past ten years she has suffered from pain in stomach and right side of abdomen, when she was "worn out;" was frequently in bed a day or two, especially after any undue exercise. Last fall was in bed two days from acute pain in appendicular region, and was very sore after getting up. Right floating kidney for five years.

Operation, October 26th, gas-ether. Trachelorrhaphy, perineorrhaphy, and nephropexy; large kidney delivered with some difficulty on account of size and adhesions. Ferguson delivery, McRae flaps, and suturing. Condition much improved; recent report.

Case IX.—Miss O. B., aged nineteen years, admitted to St. Joseph's, November 7, 1904, with the following history: Four or five years ago menstruation came every two months, lasting seven days. Since then she has had the backache all of the time, this being worse at the menstrual time; walking caused pain in the right side of abdomen, and

especially marked in the right lumbar region. Nine months, ago while in bed with "sick-stomach," she was taken with severe colic, which lasted twelve hours. Appetite has remained poor, and can walk but little on account of pain in back and dragging over appendix.

Operation, November 7th, gas-ether. Appendectomy, and nephropexy, done as in the previous operations, but kidney not completely delivered. Complete cure to date.

Case X.—Mrs. J. P. H., aged twenty-five years, admitted to St. Joseph's, March 22, 1905, giving the following history: Typhoid fever when sixteen years old; left phlebitis and enlarged inguinal glands after first labor, two years ago. Threatened with miscarriage throughout labor, and had puerperal fever after delivery eight months ago, when she had considerable pain in bladder and right side of abdomen, being in bed four weeks. Left pleurisy two months ago. Last fall she turned over on left side and felt right kidney fall forward.

Operation, March 25th, gas-ether. Curettement and trachelorrhaphy, nephropexy; capsule badly adherent, operation as in Case I. Appendectomy; McBurney gridiron. Home April 19th. (No. 2 plain catgut used in this case, and in all cases following.) Complete restoration to health.

Case XI.—Mrs. A. E. C., aged forty years, admitted to St. Joseph's, April 27, 1905, giving the following history: from sixteen years of age suffered from severe headaches, "which caused her a slow pulse." Acute articular rheumatism, nearly all winter, when she was twenty, with short attacks since. Was eighteen months recovering strength from dengue fever she had when about twenty. Mother of four children, was lacerated by the first. During birth of one of her children (?) she felt something pull loose in region of left kidney, and since then she has had more or less dragging in that side of the abdomen, which she attributed to curvature of the spine, from which she has been a sufferer since nine years of age. Nausea and pelvic peritonitis during

pregnancy, which terminated in miscarriage eleven months ago, since when she has been in bed with heaviness and pain in left side of pelvis, and almost continuous headache.

Operation, April 29th, gas-ether. Nephropexy (left), capsule badly adherent and kidney bled freely; delivery, flaps, and suturing as above. Laparotomy; both tubes resected and small cysts of ovaries excised and raw surface closed. Home, May 11th. Condition greatly improved and constantly growing better.

Case XII.—Mrs. C. M., aged thirty-three years, admitted to St. Joseph's, June 14, 1905, with the following history: mother died of some rectal trouble. She had had no special sickness, but has not felt well for several years; has had a pain in back and a dragging from right side of back. Dysmenorrhœa each month.

Operation, June 17th, gas-ether. Right nephropexy, as shown in Case I. Laparotomy; appendectomy, and cysts excised from left ovary and raw surface sutured. Layer closure. Left this country for England in October much improved.

Case XIII.—Mrs. E. F. R., aged twenty-nine years, admitted to St. Joseph's, August 15, 1905, with the following history: Indigestion until sixteen years old. When sixteen, after playing tennis, she had some uterine displacements causing her to limp. At twenty she was given "local treatment" for pelvic pains, and was in bed four months thereafter with general abdominal tenderness, distention, nausea and vomiting, and "legs contracted upon abdomen." Treated four years ago for stomach trouble, when she was told she had a floating kidney. Always conscious of an abdomen; always soreness, with tenderness on the left side. Last year right kidney dragged badly. This spring had frequent attacks of nausea. Two weeks ago was in bed ten days from nausea and vomiting.

Operation, August 16th, gas-ether. Nephropexy; oblique incision, muscles separated nicely; kidney came up well,

by Ferguson method; fat not marked; capsule thin, but stripped off readily; McRae flap and suturing; cigarette drain introduced and wound closed with three silkworm-gut and a few catgut sutures. Appendectomy; McBurney gridiron. Condition much better and gradually improving.

Case XIV.—Mrs. W. W. B., aged thirty-one years, admitted to Grady Hospital, August 26, 1905, giving the following history: had hip-joint trouble from four to nine years of age. Menstruation began at eleven and has always been painful and irregular. One child eight years old, one five, and one miscarriage two years ago. "Invalid" since her first child, when cervix was lacerated and perineum torn; three months after labor she had prolapsus uteri, which gave her much trouble until this year. Increased nervousness since miscarriage two years ago; builds up in the summer and falls off in the winter. Spring of 1904 she felt a movable tumor in right side of abdomen, which has had a large range of motion this year. Had a dragging in pelvis, and left ovary often pained her, especially after walking. For the past few years has had a "spasmodic cramp-colic" in right side of abdomen, almost always excited by eating or drinking. Some rectal trouble, with the passing of mucus, for the past six years.

Operation, August 17th, gas-ether. Nephropexy; the large wandering kidney delivered with ease, and dealt with as in Case I. Laparotomy; ovarian cysts excised and sutured. An almost obliterated appendix found in a mass of adhesions, and was amputated by Doyen method. Condition excellent.

Case XV.—Miss B. N., aged thirty years, admitted to Piedmont Sanatorium, September 1, 1905, with the following history: Father died of cancer of the face. Had osteomyelitis of left ankle when thirteen years old. For the past three years, has been having shortness of breath, caused by pain in the epigastrium, for one to two hours after eating or drinking; if eructation followed, she would often be relieved.

For the last six months, she has lived mostly upon malted milk, on account of pain coming on an hour or two after eating. Three months ago she noticed a tumor "the size of her fist" in the right side of the abdomen. This gave her no pain, except when lying on the left side, it caused a dragging in the right. Has had a great deal of backache, nervousness, and has lost much in weight during the past year. Trace of HCl. Small amount of lactic acid; absorption negative at twenty minutes; stomach dilated almost to pelvic brim.

Operation, September 2d, gas-ether. Nephropexy as in Case I. Kidney very large. Improvement remarkable. Has increased in weight from 112 to 146. Digestion excellent.

Case XVI.—Mrs. H. W. L., aged thirty-six years, admitted to Piedmont Sanatorium, September 4, 1905, with the following history: malaria when twelve years old. Peritonitis after childbirth in 1895, and was in the house for three months. Has had pain in appendicular region, every now and then, since. Had nausea and vomiting during December 1902, and for eight days she had pain in stomach, and would vomit up contents soon after eating. Since then, frequently has pain or a fulness two hours after eating. In 1904 had a diarrhœa all summer. Four weeks ago she began having pain in stomach, back, and over heart after eating. HCl in excess. Absorption and size normal.

Operation, September 5th, gas-ether. Nephropexy, an ideal operation; done as in Case I. Appendectomy; McBurney gridiron; a low, long appendix, with adhesion removed, and cysts excised from right ovary. Home, September 27th. Complete relief and continuous improvement to date; "can walk several miles without fatigue."

Case XVII.—Mrs. S. J. R., aged twenty-five years, admitted to Piedmont Sanatorium, October 10, 1905, giving the following history: Never any severe sickness. Chills and fever four years ago. In January, 1905, she was in bed several days with pain in the back and heaviness in hypogastric region, due to menstruation stopping from catching cold.

Troubled with indigestion during the past year, and during the last three months, has had an uneasy feeling in the right iliac region, with pain more marked for the past three days.

Operation, October 15th, gas-ether. Nephropexy; kidney hard to deliver on account of adhesions, and bled freely when capsule was cut. Usual flap and suturing. Laparotomy: appendectomy and suturing of left ovary after excision of several cysts. Condition good; rapidly growing better.

Case XVIII.—Mrs. P. A. A., aged twenty-five years, admitted to Piedmont Sanatorium, October 21, 1905, with the following history: never strong as a child; had diphtheria at seven, pneumonia at twelve, and malarial fever during girlhood. One child, eight years old. When child was a year old she was sick for three or four weeks with a severe cold and has never been in good health since. Troubled with fainting and nervous attacks, from which she was in bed five months, three years ago. Suffers from a heavy dragging in pelvis, shooting pains down the thighs, and some backache, all being increased by being on feet.

Operation, October 25th, gas-ether. Nephropexy; easy delivery of kidney, though a good many adhesions. Flap and suturing as in Case I. Dilatation and curettement. Laparotomy; right ovary the size of an orange; it and tube removed. Appendectomy; appendix had long bands of adhesions over it. Was amputated by Doyen method. Improving satisfactorily.

Case XIX.—Miss A. H., aged twenty-five years, admitted to Piedmont Sanatorium, November 9, 1905, giving the following history: Typhoid pneumonia about five years ago. Malarial fever three years ago, and was operated upon two years ago for appendicitis after the fifth attack. Two and a half years ago she jumped two feet and had a bloody vaginal discharge for two days. Was in her usual health until May, 1905, when she began having cramping pains in right hypochondriac region, nausea and vomiting; attack lasting three days. Second attack of ten days, and the three others of

three or four days' duration. Had some fever the first day, with last attack three weeks ago. Passes some mucus from bowels after attacks, and urine is very scanty for several days and difficult to void. Has lumbar backache and frontal headache at times, and dull heavy pain and uneasy sensation in right hypochondriac region all of the time. Tenderness marked over gall-bladder region; floating kidney.

Operation, November 10th, gas-ether. Nephropexy as in Case I. Earl clamp used and two piles excised and sutured. Complete relief.

In the above nineteen cases the wounds have healed by primary union; the stitches being removed about the seventh day, and the drainage from twenty-four to ninety-six hours, depending upon the amount of resistance. In no case has there been any after drainage or suppuration, except in Case X., where there was a slight urinary drain, for a few days after the gauze was removed, and a seropurulent discharge, from drain tract, for about two weeks thereafter. All have been right kidneys, except in Case XI.

DISCUSSION.

Dr. Charles P. Noble, of Philadelphia.—This is a subject that has interested me for a long while. I think in 1892 I began operating for loose kidney, following the example of Dr. Edebohls. From my standpoint, Dr. Edebohls deserves more credit for bringing this subject before the profession in America than all other surgeons put together.

There are one or two points, before taking up the operation, I would like to speak about. In the first place about bandages in the treatment of movable kidney. I have never prescribed a bandage myself. Many patients have consulted me who have worn bandages without good results. I have never seen any good result from the use of bandages for movable kidney. One of the most typical illustrations of the failure of bandages was a physician who consulted me, who had hæmaturia for eight years. He was convinced that his kidney was in position with the bandage applied. I operated on him, fastened his kidney,

shortly after which the hematuria disappeared, which showed that the kidney was out of place the entire time, and the twist of the vessels kept up the hematuria. When a doctor cannot tell whether the kidney is in place with a bandage or not, the layman stands a poor chance of determining it.

With reference to the results we get from movable kidney, so far as curing the symptoms is concerned, it is a question of diagnosis. A goodly percentage of those who have movable kidney are neurasthenics and hysterics, and surely we would not expect to cure them or their type of symptoms with any operation. I believe myself that is the main source of disappointment in this operation. Patients who are neurasthenic, who have hysteria, who happen to have loose kidneys, have been operated on, and the surgeons were disappointed because the symptoms have not disappeared.

As to the type of cases in which the best results are obtained, so far as the relief of the symptoms is concerned, no doubt it is that type in which the symptoms are local; patients who have intermittent hydronephrosis, who have pain in the kidney, who have a sense of dragging or of weight in the kidney, or who can feel the loose kidney as a movable tumor. Nearly all of these patients have been cured and there have been no failures. Fair results are secured by operating on those cases where the symptoms have been reflex, and where a careful diagnosis has been made to differentiate the cases from neurasthenics and hysterics. Not over ten per cent. of patients who have loose kidneys require an operation. Of all the women coming to my office for two years, every one of whom was examined carefully, twenty-five per cent. were found to have loose kidneys; forty-five per cent. had no symptoms whatever referable to loose kidney. In my own practice not over ten per cent., as an outside figure, have been operated on.

As to the anatomical results secured, I have used two methods of operating. I have used Edebohls' technique, omitting the splitting of the capsule. I have operated on a hundred patients that way, and in not a single case did I feel the kidney loose afterward. Some may have become loose, but I did not see them. In all of the patients I saw again the kidneys were in place. When Broedel introduced his suture it seemed to be an improvement in the method by direct suture, so I adopted it.

I have no doubt you are all familiar with the subject. We all know that the kidney is a friable structure. Broedel showed by experimentation that sutures passed through the kidney, the kidney being suspended by the sutures, would tear out with a certain definite weight; whereas if the sutures were put in by the method he invented, making use of the proper capsule, leaving most of the stitch on the outside of the capsule, merely catching the capsule at points to fix the suture to it, it required four or five times the former weight to cut through the capsule when this method was used. That is to say, it is much easier to tear through the structure of the capsule from within outward, than from without inward. I have used the method for a number of years, and have had none of the kidneys become loose. I think it is superior to the old method, because it obviates one difficulty with the through-and-through stitch. There is no doubt that these sutures in many cases must have cut through the kidney structure and produced linear scars where the cutting took place. It has so happened that I have never had any case of extravasation of urine after using this method; but other surgeons have reported such cases. I believe the Broedel method will obviate that possibility.

Dr. Howard A. Kelly, of Baltimore.—I am very deeply interested in this subject; I have been working at it for a number of years, and I heartily agree with Dr. Noble that we ought to operate on those cases in which there are local symptoms of an obstructive nature. We get the best results where the mobility has been confined to one kidney, and not as good results in those cases where both kidneys have been operated on, or where there has been an associated enteroptosis. I turn down all enteropotsis cases where there has been a general dropping of other viscera.

I differ slightly from Dr. Noble in regard to support of the kidney. I know of several cases that have been so much relieved by good support of the kidney that they have put off operation, and at a later date have not needed it. One of the patients got stouter afterward, and there was a decided improvement in her general condition. When a patient who has a loose or movable kidney is thin, it is hard to get any kind of support which really serves its purpose. I am speaking now of general support, and not of little pads which are disposed to exert pressure

at some particular point in the abdomen. The patient should use a support which feels snug when she is standing up, for the support is not likely to be needed when she is in the recumbent position.

I was particularly pleased to hear what Dr. McRae had to say with reference to suturing the kidney, because it is a method I have been advocating for many years, and if we follow the line of Dr. McRae's suggestion, I am sure much less injury will be done to the patient in the way of cutting, although I do not approve of the long incision he makes. My incision is about one-third the length of his. (Here Dr. Kelly went to the blackboard and demonstrated how he makes his incision, and further illustrated diagrammatically the steps of the operation.)

Dr. Charles H. Mayo, of Rochester.—I should like to say, first, by using the term movable kidney we imply that the kidney is a fixed organ. It is a bad term. I think we should decide upon the use of some other term to describe the condition of these kidneys upon which we wish to operate.

With reference to the question of prolapse of the kidney, Dr. M. L. Harris, of Chicago, came to Rochester and worked in the Woman's Department of the asylum there with a view to arriving at some conclusions as to where the kidney would be found, according to the woman's height, weight, and growth. He went into an adjoining room; he had the internes bring in patients without his seeing them, and after they made measurements he could tell where a woman's kidney would be found.

If a woman has prolapse of the uterus and you are going to make some type of operation to support it, and she has a complete laceration of the perineum, you are apt to repair the perineum when you lift the uterus. The condition is a good deal the same in fixing the kidney. If you are going to string a kidney by the neck by a few sutures, over the pocket in which it has been moving, it is a simple matter to make doubly sure by a little longer incision, pull it into position, and fix the tissues behind the colon, and close the space, and you no longer depend upon some patent method of sewing. You close the space through which the kidney has been moving. If one is as dextrous as Dr. Kelly, a small incision will do; but I believe, at first, until you become so, you had better make an incision sufficiently long to do the work required.

Dr. Daniel H. Craig, of Boston.—In the first place, I want to say a word or two with reference to the abdominal belt. Unquestionably, some of these patients with loose or movable kidneys are going to be benefited by a properly adjusted belt, and some of them may escape a future operation. But it seems to me the wearing of the belt should be merely an incident. A belt is put on practically invariably to take the place of deficient abdominal musculature, and the use of it merely as a temporary splint for those muscles brings about good results, provided you take the time to use other means in your power, physical exercise, massage, or any other means, to develop the abdominal muscles, when the belt may be left off. The wearing of a belt, without coincident treatment, by a patient with a loose or movable kidney is a distinct detriment to that patient, inasmuch as when you attempt to take it off the patient is made worse. The reverse of that is seldom seen.

I have for about two and a half years been using a technique which has been followed by extremely good results so far.

Two years ago last June an article appeared in the *British Medical Journal* advocating doing away with all sutures in fixing a prolapsed kidney and depending upon strong carbolic acid. That appealed to me as being a bad thing to do inasmuch as we all know that carbolic acid is a distinct kidney irritant; its use in such profusion necessitating the risk of getting post-operative nephritis of one type or another. But it seemed to me that with a little more caution possibly this method had some merit. Of course, what we depend upon to hold up a kidney after suturing is the adhesive type of inflammation with organization of tissue. We expect to produce sufficient adhesion to hold the organ for a while until there is an obliteration of the pocket into which it formerly slid. If we use the Broedel suture, which I have employed, and touch up the interspaces lightly between the points of suture and also the upper pole of the kidney with strong carbolic acid, we are going to set up an adhesive inflammation which will give us firm anchorage.

It seems to me that running a long needle over the twelfth rib in certain patients is apt to be attended with danger of entering the pleural cavity, but by searing the upper pole of the kidney lightly with carbolic acid, we are enabled to secure the

kidney higher than we can carry sutures and get very firm fixation.

Dr. Guy Leroy Hunner, of Baltimore.—Dr. Kelly, in speaking of the use of the Broedel sutures, said nothing about the use he makes of the loose tissues and the posterior peritoneum in helping to support the kidney. Some five or six years ago, Andrews, of Chicago, proposed the use of the perirenal capsule, drawing it up beneath the lower pole of the kidney and stitching it in the wound. Since that suggestion, we have made it a practice at the close of the operation to bring up the perirenal capsule, so that it actually draws from beneath the kidney and closes off the space through which the kidney has been sliding up and down.

Dr. Charles P. Noble, of Philadelphia.—I want to speak of one point that has been raised in the discussion. In each of the several papers I have read on the subject that point was brought out. One of the things which Edebohls did, and which never appealed to me, is to cut away the fatty capsule entirely. For years I have separated the fatty capsule from the inner side, that is, toward the spinal column, and from above and deflected it downward and outward, and then with the stitches passed below the kidney to close the muscles, the fatty capsule and the space in which the kidney has slipped up and down is caught. Then the space is obliterated and the fatty capsule is used as a pad on which the kidney can rest. The method is one which I can heartily endorse. (Dr. Noble showed the way in which he put stitches in the kidney.)

Dr. McRae (closing).—I think a great deal of credit is due Dr. Edebohls for the work he has done in regard to the surgery of the kidney. I take it, the two best points which he made were the necessity for delivering the kidney and splitting the capsule. They are of distinct advantage. I disagree with the suggestion which he made of cutting away the fatty capsule. Ferguson, of Chicago, and Edebohls were working along much the same lines at the same time. Ferguson pushed the fatty capsule forward. I had the pleasure of seeing some of Ferguson's surgical work in which he pushed the capsule forward and used it as a cushion. An advantage of the method of Edebohls of delivering the kidney, which has been brought out indirectly by Dr. Mayo, is that you separate the kidney from the colon and

push these structures well forward, and after the sutures are put in, it will close the space and fill up the pocket in which the kidney has been accustomed to get out of its normal position, or anything like its normal position.

I purposely avoided the use of the term movable kidney. I used the more expressive term of floating kidney, where there is a distinct movable tumor, so to speak, that the patient is conscious of. The simple movable kidneys that are felt with great difficulty can be operated on by any method. I believe the operation should contemplate the delivery of the kidney, which carries with it thorough separation and proper suturing.

I am rather inclined to agree with Dr. Craig that there may be danger in passing a silk suture over the twelfth rib, as suggested by Dr. Kelly, of the needle penetrating the pleural cavity. Of course, such a thing would be unfortunate. There are two possible sources of infection to the pleural cavity, though we use an aseptic suture, the skin and the kidney. Putting in a Broedel suture and employing all the different methods of suturing the kidney, which includes suturing the capsule in position, necessarily mean wounding of the kidney to a certain extent; and then they tend to pull the kidney forward. A great many of these patients that are symptomatically cured, where the kidney is held in a position in which, as Dr. Kelly said, it may be easily felt. This gives other practitioners into whose hands they are bound to fall an opportunity to say, with some degree of correctness, that the operation was not properly done.

The method of putting in these two posterior sutures is simple. It is better than making a small incision and putting in a Broedel suture. I find by making a large skin incision I can better conserve the tissue underneath. I think the point of avoiding the ilioinguinal and iliohypogastric nerves is of great importance. There have been a number of cases of urinary fistula from the insertion of sutures into the substance of the kidney. Undoubtedly most of the operations which are done for movable kidney are curative in the majority of instances. Morris in his original operation reports fifty-seven cases and fifty-seven cures by simply putting suture through the substance of the kidney, with the capsule *in situ*. Keen reports a series of one hundred and sixteen cases, with only 59 per cent. of permanent cures and 12 per cent. benefited. The balance were not

benefited at all. There are many hundreds of cases reported in the literature in which the results were good by diverse methods of operating. The original work of Dr. Kelly has been helpful.

I have not presented this as an ideal method, but as one step in the further progress of the subject.

OVERLAPPING THE APONEUROSES IN CLOSURE OF WOUNDS OF THE ABDOMINAL WALL, INCLUDING UMBILICAL, VENTRAL, AND INGUINAL HERNIÆ.

By Charles P. Noble, M.D.,
Philadelphia.

My experience with the method of overlapping the aponeuroses in the closure of wounds of the abdominal wall has given such admirable results in the prevention of post-operative hernia that since 1896 I have been an enthusiastic advocate of this method of closure as applied to all wounds of the abdominal wall no matter what their location, provided drainage was not employed. As at the present time the use of this method of closure of abdominal wounds is becoming more general, it may prove of interest if I give the development of the method in my own practice and also in the hands of others.

An article by Dr. Kenelm Winslow appearing in the February, 1904, number of the *Annals of Surgery*, entitled "The Aponeuroses the Supporting Structures of the Abdominal Wall; their Approximation for the Prevention and Cure of Herniæ," has stimulated me to write this paper, although pressure of other duties has delayed its appearance. After discussing the employment of the principle of overlapping the aponeuroses in the cure of hernia, Winslow advocates, as a novel proposition, the adoption of the same principle as a routine procedure in the closure of ordinary cœliotomy wounds which theoretically he states should lead to improved results. This article shows that all general surgeons are not informed

concerning the development of the operation of overlapping the aponeuroses in the closure of wounds of the abdominal wall and the results secured by it and indicates that an additional contribution to the subject may be of real value at this time.

Prior to May, 1892, I had employed the through-and-through silkworm-gut suture in the closure of cœliotomy wounds. The high percentage of hernia following this method, especially in fat women, led me to abandon the method in favor of the tier suture. Following the principle of Schede, of Hamburg,[1] and Edebohls, I adopted the use of the buried permanent suture. Schede began the use of the buried silver wire suture in May, 1887, more especially in the cure of large herniæ. The general surgical and the gynecological departments of the Johns Hopkins Hospital also had made extensive use of silver wire as a buried permanent suture. Edebohls[2] first employed silkworm-gut as a permanent buried suture in June, 1891, in the cure of a large umbilical hernia, and in May, 1892, he adopted the tier suture as a routine procedure, burying one row of silkworm-gut at the plane of the aponeurosis and then closing the skin and fat with a superficial row. I adopted Edebohls' technique and used it with but few changes until the end of 1896 for all wounds of the abdominal wall, including the Alexander operation, inguinal hernia, and nephrorrhaphy. The changes consisted in substituting light for heavy silkworm-gut and in closing the subcutaneous fat and skin with catgut. The results secured by this method were eminently satisfactory as to primary wound healing, the prevention of hernia, and the absence of late irritation from the buried sutures, none of which gave trouble.[3] [4]

In spite of this satisfactory experience, several considerations induced me to abandon the Ebebohls technique and to devise the method of overlapping the aponeuroses as a routine operation. These considerations were: First, the advantages of closing the peritoneum with a running catgut

suture; second, the advantages of a mattress suture in relieving tension; and third, that by special preparation of the aponeuroses and the overlapping of these structures a surface-to-surface union of the aponeuroses could be substituted for an edge-to-edge union, which promised to add materially to the strength of the resulting cicatrix. The advantages of the mattress suture and the overlapping of the aponeuroses first became apparent to me in operating for a large umbilical hernia in a stout woman April 7, 1894. Mattress sutures were introduced primarily for the purpose of taking off tension from those introduced in accordance with the Edebohls technique, but it was evident to me that an additional advantage was gained in the extent of surface of the aponeuroses which was brought into apposition. The method was used occasionally from that date until it was adopted as a routine procedure at the end of 1896, especially in cases in which considerable tension was to be overcome.

It is now so generally accepted that the chief strength of the abdominal wall as a supporting structure depends upon the aponeuroses that we will not take time in demonstrating this proposition. It is equally accepted that the chief cause of postoperative ventral hernia is defective union of the aponeuroses, leading to separation of the edges of the aponeuroses and the development of hernia. The question which presented itself to my mind was whether an improvement could be made in securing aponeurotic union over that obtained by the methods in use in 1896. I had used the tier suture after the Edebohls technique with interrupted silkworm-gut suture, and was familiar with his later technique involving the use of the continuous catgut suture.[5] It was clear to me that the aponeurotic union secured by these methods consisted in a scar of about one line in thickness between the divided edges of the aponeuroses, provided accurate union through out the length of the wound was secured. It seemed to me that a much stronger union could be obtained by substituting a surface-to-sur-

face union for an edge-to-edge union, therefore the method was devised and after various changes is now carried out as follows for cœliotomy wounds:

The incision in the hypogastrium for operations on the female pelvic organs may be taken as the type. This incision is made by choice through the inner border of the right rectus muscle. In closing the wound the peritoneum is first closed with a continuous suture of fine cumol catgut. The fat is then dissected from the upper surface of the aponeurosis of the transverse muscles on the left side of the wound from one-third to one-half inch. The aponeurosis upon the right side of the wound is then separated for an equal distance from the rectus muscle. The muscles and fasciæ are then sutured by means of a medium weight chromicized catgut suture in the following manner: the suturing is begun at the lower angle of the wound upon the left side. The suture is passed from above downward through the aponeurosis and rectus muscle. Then the separated bundles of the rectus muscle are united with a continuous suture until the upper angle of the wound is reached, when the suture is passed from below upward through the aponeurosis upon the right side of the wound, and an additional suture is taken above this point to fix the suture and take the strain off that part which has brought the muscle in apposition. The aponeurosis is then closed from above downward by catching the aponeurosis from the left side of the wound after the manner of the Lembert intestinal suture, and then passing the needle from below upward through the aponeurosis upon the right side of the wound. When this suture is drawn taut, it slides the aponeurosis of the right side of the wound upon the aponeurosis on the left side of the wound. The process is repeated until the lower angle is reached, when the two ends of the suture are tied. In long wounds two or more mattress sutures are placed to take tension off the lines of continuous suture. The fat is closed with a continuous suture of fine cumol catgut. The skin is

closed with fine cumol catgut suture by the intracuticular method. When median wounds are long, extending near or above the umbilicus, care is taken to unite the posterior aponeurotic sheath of the rectus muscle with the peritoneum.[6]

The method was at once used for all wounds of the abdominal wall, including herniotomy wounds, modifying slightly the operation in accordance with the anatomical conditions to be dealt with. In the beginning mattress sutures of silkworm-gut were used to close the aponeurosis. Since introducing the method I have used it constantly, modifying the details somewhat, but never the principle involved.

In 1898 silkworm-gut mattress sutures were abandoned and a continuous chromicized catgut suture for the rectus muscle and for the aponeuroses was substituted.[7] With the adoption of catgut it became feasible to make some further improvements in the method. Care was taken to suture the posterior sheath of the rectus muscle together with the peritoneum when the median incision was high enough to divide that structure. In operating for appendicitis the incision through the outer border of the rectus muscle was adopted, and a fine chromicized catgut suture was employed to close the posterior sheath of the rectus together with the peritoneum. In this way not only the anterior but the posterior aponeuroses were carefully united. The same method of suturing was employed for inguinal hernia and for Alexander operations.[8] [9]

Having traced the development of the method of overlapping the aponeuroses in its general aspects a reference to some of its special applications is in order. My original paper, "A New Method of Suturing the Abdominal Wall in Cœliotomy" (1897), opens with the following paragraph: "I desire to report a new method of closing the wound in cœliotomy, which I believe will give good results in all cases, and will enable the surgeon to deal successfully with cases of diastasis of the recti muscles, which heretofore have been most difficult to cure."

Since that time the method had been employed repeatedly for the cure of diastasis of the recti, and so far as is known in no case had there been a recurrence or the development of a ventral hernia. I am satisfied that the method by overlapping the aponeuroses will give better results than that proposed by Webster in 1900.[10]

In the cure of herniæ the method of overlapping the aponeuroses is especially important and valuable. As already stated, it was first employed by myself in the closure of an umbilical hernia in 1894. Since that time the method has been employed in almost all operations for hernia, whether umbilical, ventral, or inguinal. In operations for umbilical hernia at times there is less tension when the aponeurosis is overlapped from above downward instead of from side to side. If good surface-to-surface aponeurotic union can be secured a permanent cure will be effected even though the recti muscles remain separated. I first made use of the plan of overlapping the aponeuroses from above downward February 14, 1898. In this case it was impossible to approximate the recti, and as there was far less tension from above downward than laterally the transverse suture was adopted. This method of operating upon umbilical hernia has been largely employed by W. J. Mayo,[11] who first reported upon its use in 1898. In this paper, after describing the method of overlapping which he had employed, he states that it was similar to my method of closing cœliotomy incisions. Since that time Mayo has made two further reports upon the cure of umbilical hernia by overlapping the fasciæ, and has especially recommended the overlapping from above downward.[12] [13]

The principle of overlapping the aponeurosis in the cure of inguinal hernia was first applied by Lucas-Championnière in 1892 or earlier.[14] In 1901, in his brochure on the radical cure of inguinal hernia,[15] he reported a series of seven hundred and fifty-nine operations. It is not necessary in this connection to discuss the methods used by Championnière

in dealing with the sac and the inguinal canal itself. The question of particular interest is his method of dealing with the aponeurosis. He devised what he calls a U-shaped suture, which is a modified mattress suture, by means of which he overlapped the outer segment of the aponeurosis upon the inner segment, and then by means of interrupted sutures made the approximation neat. I can find no indication that Championnière employed the principle of overlapping the aponeuroses otherwise than in the cure of inguinal hernia, and must therefore conclude that he failed to appreciate its value in the closure of cœliotomy wounds in general. The method of suturing which he used accomplishes the overlapping of the aponeurosis very satisfactorily, but it is much more complicated and more tedious in its application than the method which I have devised.

E. Wyllys Andrews was the next surgeon to make use of the principle of overlapping the aponeurosis in the cure of inguinal hernia. He called the method which he devised the "imbrication or lap-joint method."[16] He refers to the work of Championnière, which he regards merely as an improvement of the usual method of closing the inguinal canal. His own operation accomplishes two purposes: first, the overlapping of the aponeurosis; and second, the transplantation of the cord into an artificial canal. He sutures the inner layer of the aponeurosis to Poupart's ligament behind the cord. The outer layer of the aponeurosis is then sutured above the cord to the inner layer. From the standpoint of the more general use of the principle of overlapping the aponeuroses, Andrews' article is of special interest, as he states that "the principle of imbrication or overlapping the several aponeurotic layers of the abdominal wall may enter into other abdominal operations to advantage, as I have repeatedly shown." In a second article on the radical cure of hernia,[17] in 1897, after discussing his own and other methods for the cure of inguinal hernia, he concludes with the following:

"I cannot refrain from stating that I have found the principle of imbrication applicable to other purposes, such as uniting abdominal wounds after ordinary cœliotomy near the linea alba and linea semilunaris, but in this part of the subject I cannot hope to interest you at the present time."

It is thus evident that Andrews appreciated the value of the principle in suturing all wounds of the abdominal wall, and therefore it is probable that he made more or less systematic use of it.

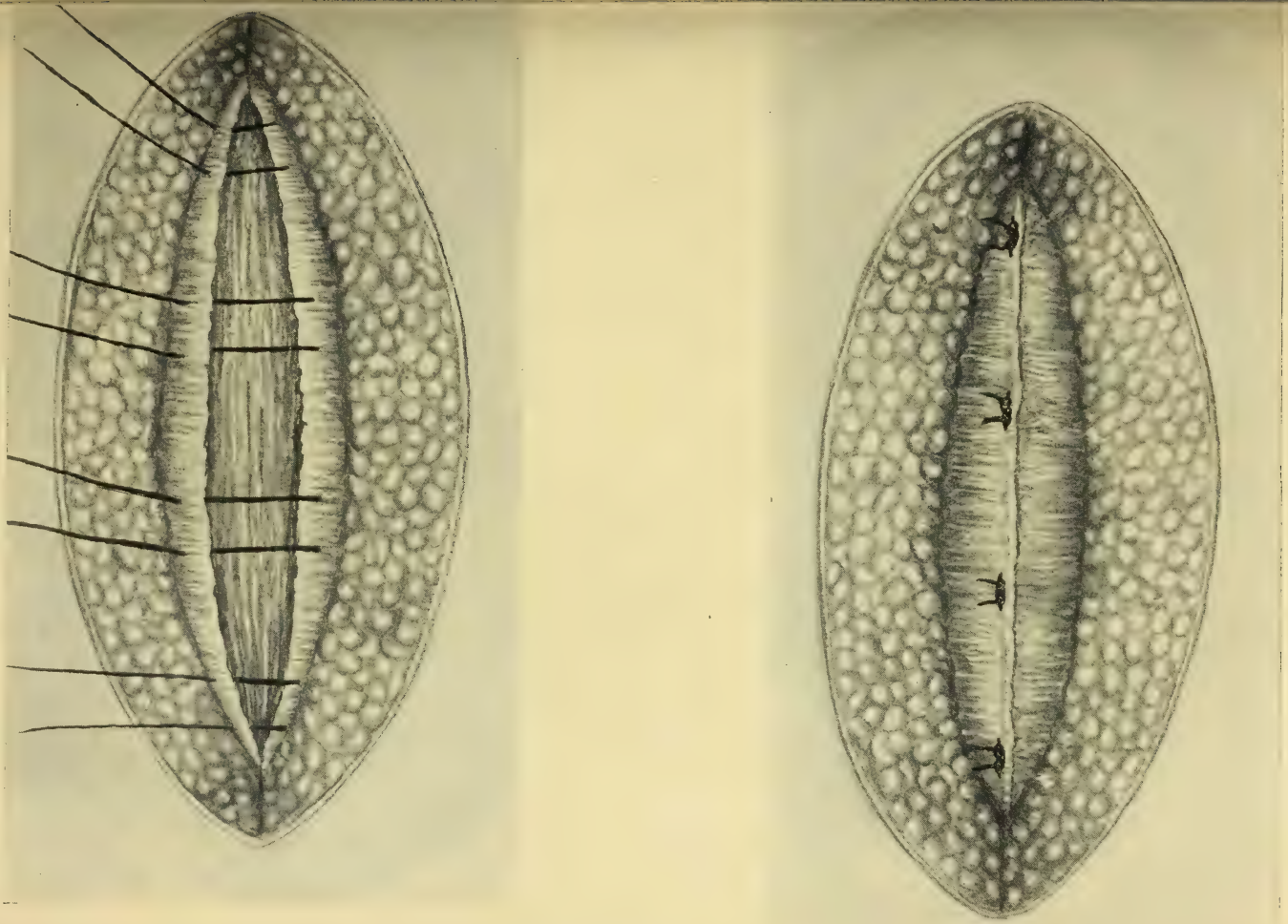
If this paper were a study of the development of the radical cure of inguinal hernia, it would be necessary to refer to the operations of Bassini, Halsted, and others, but with its actual limitations it is only of interest to point out that in the Johns Hopkins clinic practical experience showed the limitations of the original Halsted operation with the typical mattress suture. Bloodgood tried to meet the necessities of the case in large herniæ by transplantation of the rectus muscle and by use of the sheath of the muscle to take the place of the conjoined tendon.[18] Halsted[19] still later reports that in certain cases he makes a flap from the cremaster muscle, which is sutured to the under side of the internal oblique muscle. The conjoined tendon and the internal oblique are sutured to Poupart's ligament, and then the aponeurosis of the external oblique is overlapped. Halsted states that this is known as the Andrews method, although devised independently by him.

My own work in the cure of inguinal hernia has been incidental to that in abdominal surgery in general and gynecology, and I have never devoted special study to the closure of wounds of the inguinal canal, whether for inguinal hernia or the Alexander operation. In operations for inguinal hernia in women the Bassini operation has been done, with overlapping of the aponeurosis of the external oblique. In the Alexander operation the same technique has been followed, with the exception that the round ligament has been included in the sutures which unite the internal oblique

to Poupart's ligament. In addition, I frequently place a mattress suture of silkworm-gut at the internal ring in hernia operations to reinforce this point—the suture entering the external oblique, passing through the internal oblique, through Poupart's ligament, and then back through the internal and external oblique. This suture is tied after the canal is closed in the usual way.

In my own work the development of the principle of overlapping the aponeuroses in the closure of wounds of the abdominal wall grew out of my experience with the other methods of closure previously used, and was the natural consequence of recognizing the shortcomings of these methods. The application of the principle to the cure of inguinal hernia, to the cure of umbilical hernia, and to the cure of diastasis of the recti muscles was a natural development from the use of the principle in the usual cœlitomy wound and for operations for appendicitis and for movable kidney. I was not aware of the work of Championnière and Andrews in the cure of hernia, as not being a general surgeon and having no occasion to operate for inguinal hernia in men, I had given no critical study to the special literature concerning inguinal hernia.

It is quite clear that to Championnière is due the credit of having first appreciated the advantages of overlapping the aponeuroses; apparently, however, he did not realize that the principle had any application elsewhere than in the inguinal canal. With Championnière's work as a basis, Andrews developed a special technique for the cure of inguinal hernia, and also more fully appreciated the importance of the principle, as shown by the references already given to his articles, in which he claims that the method can be applied with advantage to the usual cœliotomy wounds. It is evident that the process by which Andrews arrived at this opinion was exactly the reverse of my own experience. A realization of the advantages of the method in the special operation for the cure of inguinal hernia suggested its employment in all other



Modified mattress suture for closing the aponeurosis with silkworm gut.

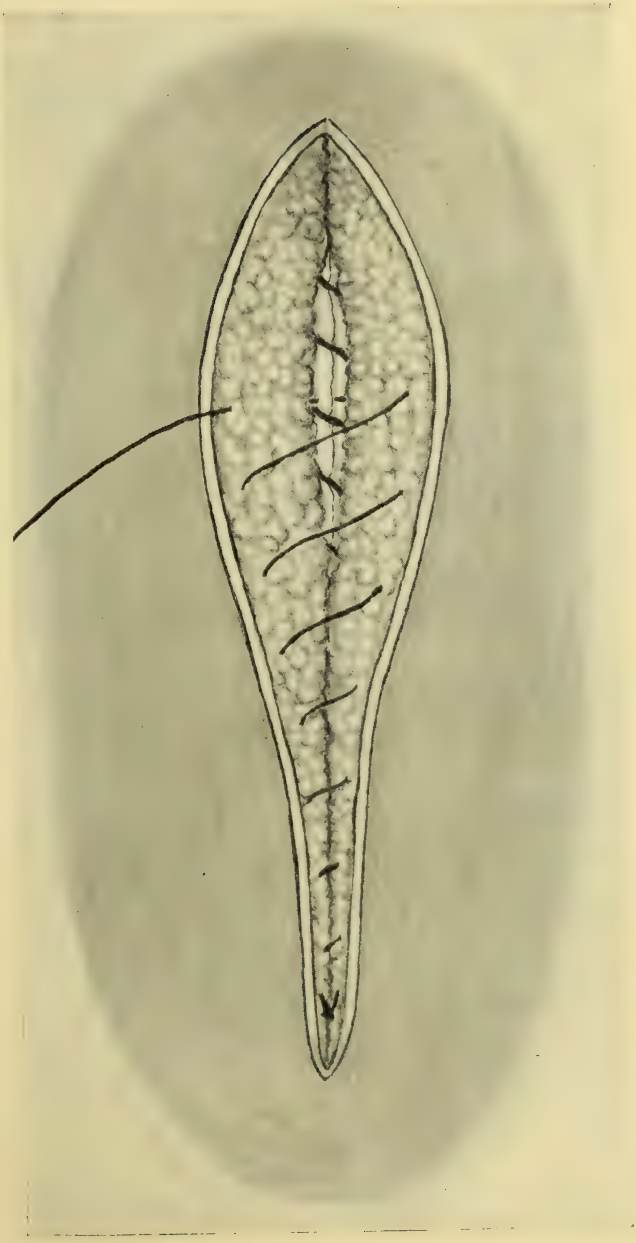
Fig. 2.

Closing the abdominal wound.—1. Suture of the peritoneum with a fine running cumol catgut suture. 2. Preparation of the aponeurosis for suturing. (*a*) Separation of the right aponeurosis from the rectus muscle. (*b*) Dissection of fat from the left aponeurosis.

Fig. 3.

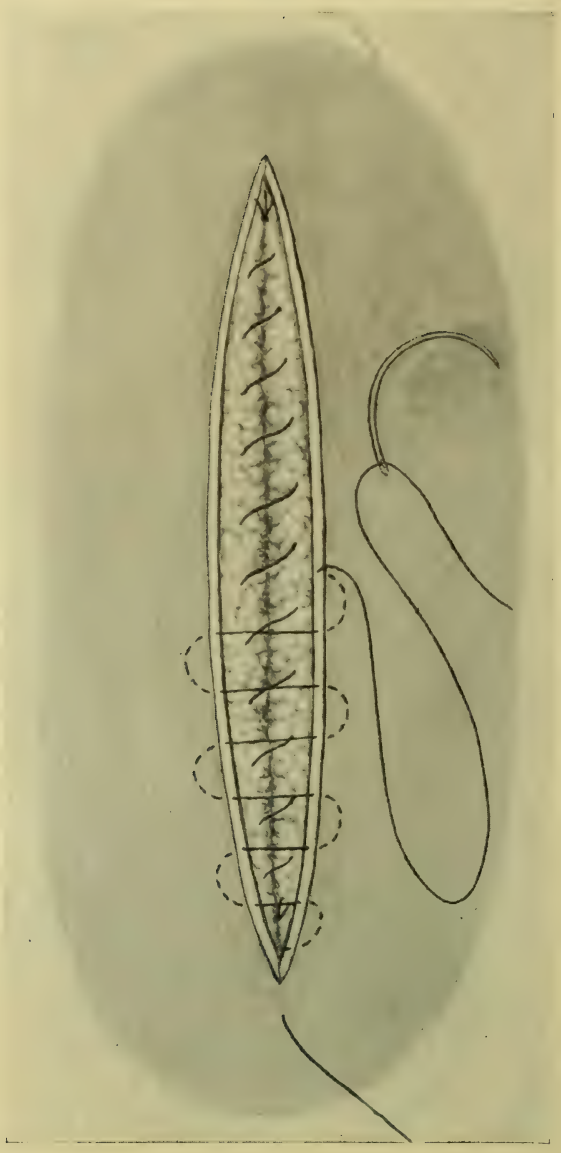
Closure of the wound in the aponeuroses of the oblique muscles. Overlapping the aponeuroses by superimposing that of the right side of the wound upon that of the left, and suturing with a continuous chromicized catgut suture.

Fig. 4.



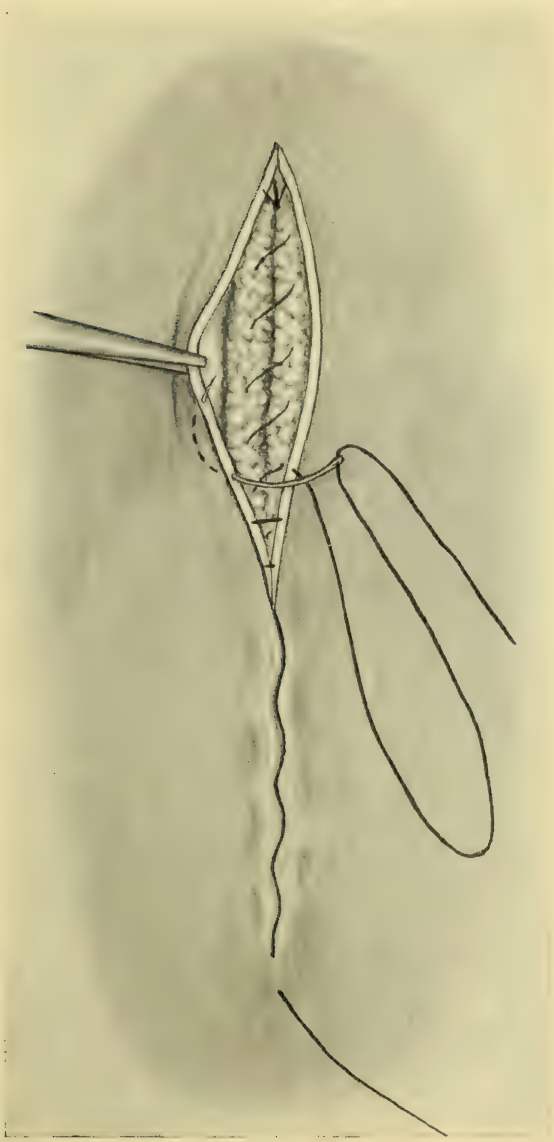
Suture of superficial fascia and fat layer.

Fig. 5.



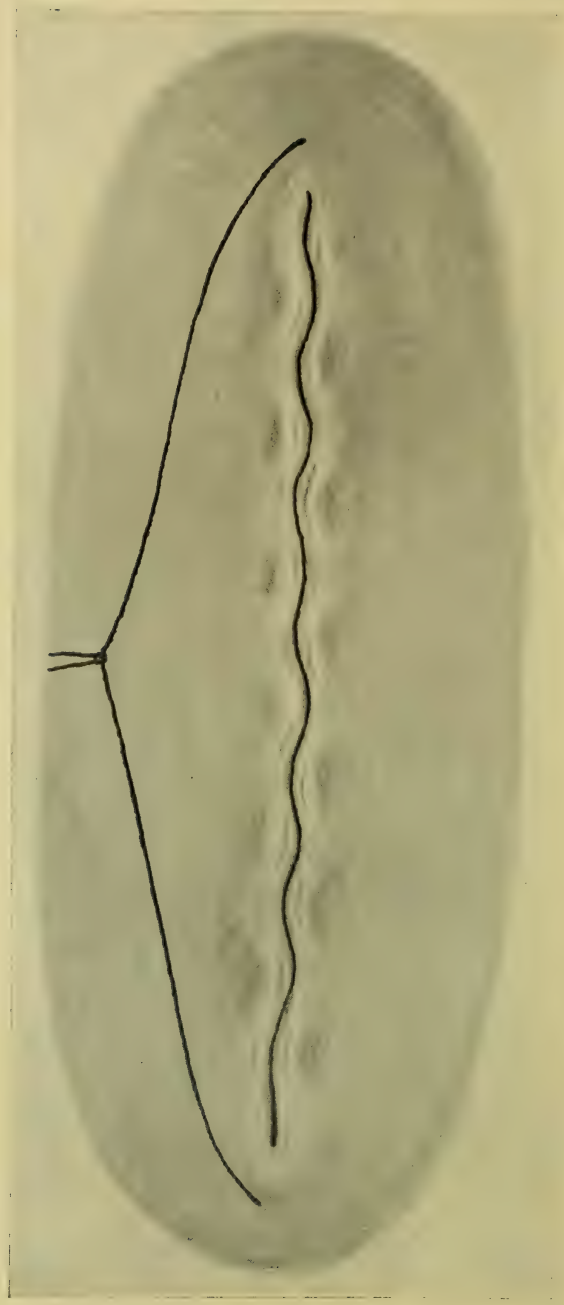
The subcuticular suture of the skin.

Fig. 6.

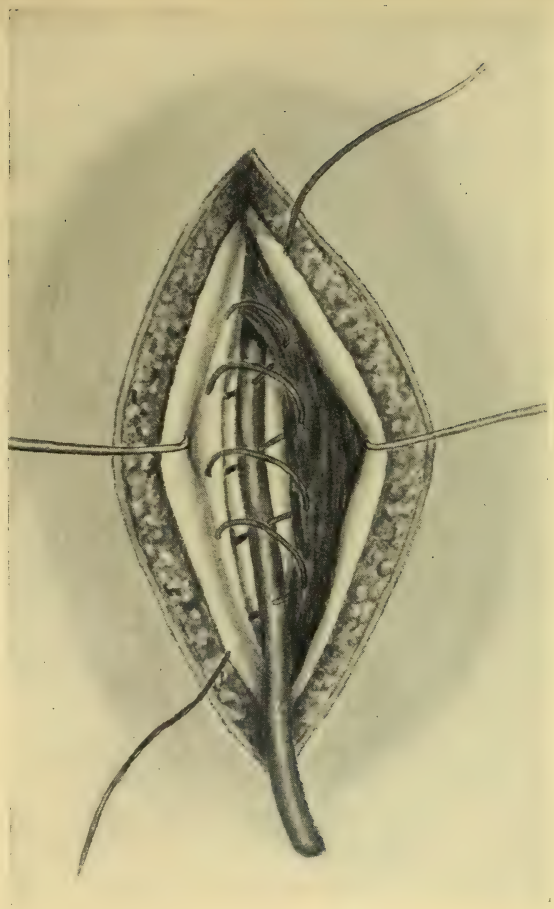


Skin wound partly closed by subcuticular suture

Fig. 7.



Final closure of skin wound.



Shortening the round ligaments. Suturing the internal oblique round ligaments and Poupart's ligament with chromicized catgut, to fasten the ligament and obliterate the canal.

Overlapping the aponeurosis of the external oblique in closing the inguinal canal.

Fig. 10.

Championnière's method of overlapping the aponeurosis of the external oblique—inguinal hernia. Showing U-sutures, and interrupted sutures in place

Fig. 11.

Championnière's method—showing the U-sutures tied, and the interrupted sutures in place for tying.

Fig. 12.

Andrews' imbrication or lap-joint operation for inguinal hernia.

abdominal wounds; whereas, in my own work the appreciation of the advantages of the method in the closure of abdominal wounds in general led to its employment in the special operations on the inguinal canal.

The best evidence which I can give as to the practical merit of the method in the prevention of postoperative hernia is the fact that during the nine years in which the method has been in use, but a single patient has presented herself with postoperative hernia. Others may have occurred of which I have no knowledge, but it is quite clear that postoperative hernia plays an unimportant rôle when the aponeuroses are overlapped in the closure of cœliotomy wounds.

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DISCUSSION.

Dr. William H. Wathen, of Louisville. — This is one of the most practical subjects that can be brought before this Association. If we will all look back a few years, we will find many of our cases of cœliotomy and of various operations, where we applied sutures, were followed by suppuration and by hernia. There have been so many methods devised of applying sutures, that it seems difficult to remember them.

Only a few years ago various methods of suturing the intestinal tract from the stomach to the end of the bowel were devised by our best surgeons, supposing that it was almost impossible to get a suture that would serve the purpose correctly. Plates of various kinds and mechanical appliances were used. It is now known that it is usually a very simple matter to suture the intestinal tract; we need no mechanical appliance, and we need nothing, as a rule, but a double layer of interrupted sutures of chromicized catgut, celluloid thread, or of silk, and our results are almost perfect. Now, the sooner we eliminate most of the methods of application of sutures that have been devised by hundreds of men the better it will be for our patients. There are practically but two methods of applying sutures necessary

in all operations. The one that can be applied in more cases than any other is the continuous suture; the other is the interrupted suture. Now, the continuous suture is one that should be applied where it can, because it is more rapid, and in many instances serves a better purpose than any interrupted suture we can use. This is particularly so in stomach and in intestinal surgery. With it we have rapidity of application and perfection of union. Where we have traction, as in the abdominal muscles it may be better to apply the interrupted suture to hold the muscles together, and tie it gently and use as small a suture as possible. We may practically eliminate the non-absorbable sutures that are being used, and substitute absorbable sutures, catgut or kangaroo tendon, and there is hardly any operation in surgery, that cannot be completed with these sutures. We need not use in an abdominal wound for a primary laparotomy or for secondary operations, where we have hernia, any other sutures than the absorbable suture of catgut or kangaroo tendon. The peritoneum having been closed by small continuous catgut sutures, the muscles by continuous or interrupted catgut sutures, tied gently we come to the fascia. It is not a question of a special method of lapping the fascia, but of getting perfect broad union of the fascia. If we could get perfect union of the fascia edge by edge, it would be all right, but we cannot do it, because certain parts of it do not unite, and we have imperfect union. The lapping of the fascia by throwing the posterior surface of one side over the anterior surface of the other side gives beautiful results. Lapping of the fascia by simply pulling the fascia up and uniting the posterior edges gives equally good results, or lapping of the fascia by infolding the anterior edges and getting union of the anterior surface, likewise gives equally good results. It is, then, a question of bringing the fascia together and holding it so until it unites in its entirety. There is no hernia following the primary operation if we apply the sutures properly and destroy all dead tissue space and prevent suppuration. We should see that the sutures are tied without constriction of tissue, and that the surfaces are properly brought together. In the skin surface I think the interrupted suture probably gives a more perfect apposition with less danger of suppuration. The danger of suppuration is largely in the skin suture. In order that we may prevent tension upon the skin suture, we can

introduce from three to four or five interrupted sutures just under the skin, including fat, the surface of the fascia. Therefore, I say in conclusion, the sooner we recognize the fact that there is with the fewest possible exceptions, no necessity for using a non-absorbable suture, and confine ourselves to the use of the catgut or kangaroo tendon, the better will be the immediate and end results.

Dr. Howard A. Kelly, of Baltimore.—I think there is a general feeling on the part of the members of this association that Dr. Noble is to be congratulated on what he has done in elucidating this subject. I believe he has greatly added to his reputation to-day in this clear paper coming from his facile pen. I am glad to hear his claims of priority presented on such substantial grounds.

Dr. Charles M. Rosser, of Dallas.—I wish to call attention to one point and that is this: Dr. Noble said that this method of overlapping the aponeurosis was not so applicable in drainage cases. It occurs to me that if we adopt the practice of drainage through stab wounds at the dependent points the method described by Dr. Noble is as applicable as in clean cases and certainly it is more important as a precaution. For some time we have been closing with figure of eight suture and never drain through operative incision.

Dr. Noble (closing).—With reference to the point made by Dr. Rosser, that this overlapping can be done in cases where drainage is resorted to, I will say that wherever a stab wound is made the principle is a good one. In these drained cases I have always used the interrupted suture. I remember very well how the matter appeared to me when I first thought of it. It occurred to me that the strength of the aponeurotic union, with edge-to-edge union, depended upon the thickness of the aponeurosis. About that time Halsted did a great deal of work with the mattress suture, turning up the under surface of the aponeurosis. It seems to me, if the aponeurosis were sutured together in that manner, in the first place, the abdominal wall would be shortened transversely twice, the length of the turned up portion, thus increasing tension, and producing a tendency to pull open the cicatrix from below. Whereas if the aponeurosis were overlapped the same distance, it would shorten the abdominal wall transversely but one-half as much,

and therefore there would be that much less tension. As to the strength of the wound secured instead of having a scar a line in thickness, you have a scar the breadth of the overlapping, whether one-third or half an inch, with the same thickness of scar. As a matter of mechanics there is no doubt as to which is the stronger union. Those were the points that occurred to me in the beginning.

CHRONIC ENDOCERVICITIS.

A NEW METHOD OF TREATMENT WITH NEW INSTRUMENTS.

By Daniel H. Craig, M. D.,
Boston, Mass.

In exploiting at this late day a new method of treatment for a condition which has been the subject of debate ever since, to say the least, the birth of gynecology as a specialty, it is as well to begin by establishing in your minds by argument what has been established in my mind by experience, namely, the advisability of instituting an independent treatment of chronic endocervicitis as an entity.

There has been the greatest diversity of opinion expressed by all modern writers upon gynecology as to the independent existence of endocervicitis, acute or chronic. Permit me, in the interest of time-saving, to waive the discussion of the acute forms of endocervicitis and to speak only of the chronic forms. There are four ways of determining whether or not chronic endocervicitis may exist independently of associated corporeal endometritis. These are by postmortem findings, by postoperative hysterectomy findings, by submission of sections from both cervix and body to microscopic investigation and the proof of its independent existence by the clinical test of treatment. Many pathologists have thoroughly exploited the postmortem findings with a very general consensus of opinion in favor of its independent existence. Pozzi has thoroughly and convincingly

shown by postoperative hysterectomy findings that chronic endocervicitis may exist without associated corporeal endometritis. In this instance this is the more noteworthy inasmuch as Pozzi started out to prove the reverse. Of the two remaining ways the first and eminently scientific manner would be the submission of excised portions of both cervical and corporeal endometrium from the same case to microscopic interrogation. This method lacks, however, in practical safety what it so eminently possesses in scientific value. First, because a healthy fragment might be examined from an endometrium partially, or even largely inflamed. Second, and by all means most important, the employment of this means necessitates the traversing of a cervix known to be diseased, with a strong presumption in favor of an organic infectious etiology in order to reach an endometrium not known to be as yet involved. This cannot be done without imminent danger of infection of healthy tissues should the endometrium be found healthy. Therefore, if any safer method, practically satisfactory, exists we are in duty bound to employ it. And I am convinced that such a safe way exists in the fourth way above mentioned, namely, by the clinical test of cure of all symptoms by competent treatment directed to the cervical canal only. Many cases throughout a considerable experience amply prove the value of this method. To be explicit I have many times been able to entirely remove all symptoms and signs of the original disease in cases in which, from definite indications, a positive diagnosis of uncomplicated endocervicitis existed. This constitutes conclusive proof that for all practical purposes the disease was uncomplicated chronic endocervicitis, and leads me to state conclusively that chronic endocervicitis does exist without concomitant corporeal endometritis. Furthermore that in those cases in which it so exists it is relatively easy of extermination.

With this preface permit me to consider the subject in orderly detail.

Etiology. The causes of chronic endocervicitis are often dismissed with a word and are on the other hand sometimes considerably elaborated. Pryor[1] said that all cases of endocervicitis are due to lacerations of the cervix or to gonorrhœa. This I consider too arbitrary and dogmatic. Dudley[2] specifies five causes: 1. Extension of infection from the vulva, vagina, or endometrium, especially infection of gonorrhœal origin. 2. Puerperal laceration of the cervix. 3. Excessive coitus. 4. Foreign bodies, tumors, polypi. 5. Infection from unclean instruments and fingers. This enumeration appeals to me. For brevity perhaps Mundé's statement takes precedence. He summarized the causes as "everything which produces chronic pelvic congestion."

While, as with the etiology, I have nothing new to add I wish to bring out a few points in the *anatomy* of the cervix, and while there are slight variations of opinion the description of the cervical mucosa by Quain[3] seems the best and is as follows:

The mucous membrane of the cervix is much firmer and more fibrous than that of the body. Between the rugæ of the *arbor vitæ* there are numerous saccular and tubular glands. In the lower part of the cervix the mucous membrane is beset with vascular papillæ and the epithelium is stratified, but in the upper half or more the epithelium is columnar and ciliated like that of the body. The glands, *which are short*,[4] with a large lumen, are everywhere lined with columnar ciliated epithelium, even where the epithelium of the surface is stratified. Besides the follicular glands there are almost constantly to be seen the so-called *ovula nabothi*, clear yellowish vesicles of variable size, but visible to the naked eye, embedded in the mucous membrane. These probably arise from closed and distended follicles; but their nature is still doubtful. Waldeyer[5] also particularly calls attention to the greater thickness of the cervical mucosa. This anatomical structure while greatly perverted by the time a case of chronic endocervicitis presents itself for treatment still remains important in two particulars, namely, the thick-

ness of the mucosa and the shortness of the glands, making the glands, even after long periods of disease, little likely to penetrate the deeper underlying muscular tunics of the cervix as happens regularly in the corpus uteri. Aside from the above histological character of the mucous membranes I wish only to direct your attention to the so little appreciated internal os. This is variously estimated by gynecologists and anatomists between wide extremes. Some speak of it as a fold of the mucous membrane while at the other extreme stand those who ascribe a definite musculature to this region. Its calibre is stated equally variously between the diameter stated positively by Deaver[6] as 3 mm. and a slight constriction between the two cavities. The widest diameter positively ascribed to it is 3 to 5 mm. The length of the cervical canal between the external and internal ora is 2.5 cm. in the cervix which has not been foreshortened by laceration and consequent eversion of the lips.

Pathology. The pathology of chronic endocervicitis has been so well understood and so often described that a careful study of many cases has failed to enable me to add to our knowledge and I shall therefore content myself with merely calling your attention to the pathological foundation upon which my treatment has been based.

In chronic endocervicitis the inflammation is never superficial. The microscopic examination of segments of the inflamed tissue removed with the sharp curette invariably shows the disease to have affected to a greater or less degree, practically all the component elements of the mucous membrane. Many glands are distended with secretion and cellular débris, the colunnar epithelium being flattened and many layers thick. In some the orifice is completely occluded, in others plugged by the exfoliated epithelium from the gland walls and in a few still patulous. The glands are so distended that pressure atrophy of the surrounding connective tissue elements is marked and there is more or less but never extreme round-cell infiltration. Except in

unusually old and severe cases the muscular tunics are not penetrated by the diseased glands, but sometimes this does occur, the muscle fibres atrophying, before the on-pressing, distended gland until it actually presents under the mucous membrane of the portio vaginalis where it becomes manifest as a retention cyst.

Symptomatology should need no special attention here. The symptoms are as variable as the other factors, but the only two which have attracted my attention by their accentuation, by their annoyance of the patient, and by their very sudden and satisfactory disappearance under treatment have been the leucorrhœa, of course, and a very sharp and persistent localized backache. These are by no means the only symptoms but are the most noteworthy through regularity of appearance through a long series of cases.

Diagnosis. The diagnosis affords me an opportunity to say something for myself, but before doing so I wish to justify my position by a quotation from, so far as I am able to learn, the very latest authoritative work on gynecology. In this connection Ashton[7] says: "The differential diagnosis depends upon determining the source of the discharge. This is rarely possible, as endometritis is usually associated with endocervicitis; and besides, it is of no practical value to distinguish between the two conditions as the treatment is the same for both." From the first part of this quotation I should take but one exception: I should say that endocervicitis was *often* instead of *usually* associated with corporeal endometritis. From the concluding portion I dissent entirely. My experience leads me to believe that a very simple sign differentiates the two conditions absolutely.

I referred above to the variety of description of the internal os. I agree emphatically with those who ascribe a certain definite musculature to this region and believe that the internal os is capable of undergoing considerable variations of calibre in the unimpregnated state of the uterus. It is upon this variability of calibre that I have based my diagnosis.

Nature everywhere throws all possible barriers before the advance of inflammation and infection, two perfect examples of which are the line of demarcation in gangrene and the peritoneal adhesions about intra-abdominal infections. In chronic endocervicitis we see no exception. The internal os constitutes not a passive but an active barrier to the passage of infection from the cervical into the corporeal cavity. This fact you can easily demonstrate in every case by simply introducing an ordinary Simpson or Sims uterine sound up to the internal os. Should the inflammation prove to be localized exclusively within the cervical canal the bulbous tip of the sound will pass the firmly contracted internal os only upon the expenditure of considerable force even though there be no angle nor flexion between the two cavities. This barrier represents far more resistance than any turgid, œdematous, or even hypertrophied mucous membranous fold could possibly cause. Moreover, many cases have demonstrated conclusively that an internal os which is thus resistant before treatment becomes patulous in a manner and with a speed entirely incompatible with hypertrophy.

On the other hand in every case in which a chronic endocervicitis and corporeal endometritis coexist nature, with equal care, provides against back-pressure of infectious material into the Fallopian tubes and thence to the peritoneum by widely relaxing the internal os so that in this class of cases with the same sound it is nearly if not quite impossible to accurately determine the site of the internal os so widely is it open. In the interests of free drainage its musculature is relaxed to the utmost.

The diagnostic relevancy of the foregoing seems to me apparent. Given a contracted internal os, the inflammation lies below it; given a relaxed internal os the inflammation is above as well as below it. Our treatment, at least by the method which I shall outline below, must be confined to those cases in which beyond a doubt the internal os is closed so tightly as to offer unmistakable resistance to the entrance

of the uterine sound. In many cases even a small probe can only be passed with the use of considerable force. Incidentally it is interesting to note that this function of the internal os is tacitly, I do not know whether intentionally or not, admitted by most authors. A single quotation not radically different from what we find out in most text-books will serve to illustrate this point. Dudley,[8] in his last edition on page 213, says, "Although the normal endometrium is free from pathogenic bacteria the cervical cavity is quite accessible to them." This analyzed means that some impassable means of resistance to infection is interposed between the cervical and corporeal cavities. This barrier we do not believe to exist in the corporeal secretion because this secretion does not sterilize the once infected endometrium. For the same reason the resistance cannot be assumed to have its origin in the corporeal circulation. It cannot be in the ciliary activity because a similar, equally efficient ciliary activity exerting its force in the same direction, toward the external os, exists in the cervix. By this process of exclusion what remains which so satisfactorily explains this immunity of the endometrium, especially in view of the foregoing, as the acceptance of the active mechanical barrier provided by the muscularly contracted internal os?

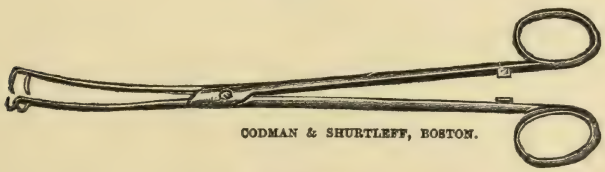
At this point I wish to digress to submit the suggestion that in cases of sterility in which no cause other than chronic endocervicitis can be found and in which the sterility has been attributed to the plug of tenacious mucus within the cervical canal that in my opinion the contracted internal os offers a more formidable barrier to the entrance of spermatozoa than the mucus does.

Prognosis. The prognosis of chronic endocervicitis has never been anything but good as regards the life of the patient and has never been anything but bad as to recovery except by radical operation. I refer to operations of such magnitude as to necessitate the use of a general anæsthetic and requiring a more or less protracted confinement to the

bed with the consequent loss of time, and of course, in the case of wage-earners, money. Every text-book for generations has given a bad prognosis as to cure by palliative and caustic remedies and has still offered no substitute except the above-mentioned operations. At the end of three years' work with my present method I feel no hesitation in promising a speedy cure without the loss of any time, without confinement to bed and without anæsthesia, except that occasionally, in those known to be excessively nervous or hypersensitive, a few crystals of cocaine are used at the external os. With the cervix practically all acute sensibility is as closely confined to the external os as is the case of the urethra and the external meatus.

Treatment. First let me describe the salient points of the instruments which I have devised with which to treat these cases. The length of the three instruments is equal, and is 22 cm. This length was chosen as the shortest which would enable the gynecologist to satisfactorily accomplish the treatment without allowing his hands to come in contact with the patient. This seemed to me important because this method being designed for use at the office or out-patient clinic the thorough sterilization of the hands consumed too much time. With this length of instrument ordinary manual skill and dexterity render such sterilization entirely unnecessary.

Fig. 1



Forceps.

The cervical forceps were designed to grasp the anterior aspect of the portio vaginalis as near as possible to, but not into, the external os. The tissues are here very often so soft as to tear when so grasped by the ordinary tenaculum or

tenaculum forceps under the strain to which this grasp is to be subjected. The ordinary grasp with one blade within and the other without the cervical canal will later be seen to be obviously impossible in the use of either the dilator or the curette. The two pairs of opposed teeth give a grip which has never lacerated. The curve on the flat facilitates the combined use of the forceps and dilator with one hand.

The external os dilator was suggested by the conical calibrator used in dilating the external urinary meatus preparatory to cystoscopic work. In fact the urethral calibrator was used for this work until the past few months. Each of its dimensions is definite and has its *raison d'etre.*

It is of rigid steel throughout. The diameter of its tip is 2 mm., which is as small as it could be made without actually giving an angular point. The length of the cone from

FIG. 2

Dilator.

tip to shoulder is 2 cm. This length was chosen because, it being 0.5 cm. less than the ordinary depth of the cervical canal it would even permit of some eversion, due to laceration, without the tip of the cone impinging upon or going through the contracted internal os. A cervix in which there is more than 0.5 cm. foreshortening owing to laceration and eversion is so patulous as not to require the use of any dilator. The narrow parallel surface just before the shoulder facilitates the retention of the dilator within the external os long enough to produce sufficient relaxation without maintaining so forcible a degree of pressure as to be constantly disagreeable to the patient. This need was very manifest in the use of the conical calibrator. The shoulder is of course self-explanatory. The flattened base of the handle facilitates the maintenance of a steady unirritating pressure.

The perimeters of the shoulders are made hexagonal to prevent rolling and so coming in contact with unsterilized material.

The only features about the curette which need attention are the shape and width of its cutting blade. It is sharp, the edge being obtained by bevelling from above downward and inward making the blade cut as the curette is withdrawn. The blade and its fenestrum are triangular presenting a base of 6 mm. and relatively sharp angles. The base is just twice the diameter of the normal internal os as stated by Deaver. This excess width serves to render it impossible to introduce the curette past the internal os unless it be dilated, which in itself constitutes a contraindication to the use of this curette, without the employment of sufficient force to lacerate the tissues. The sharp angles serve, upon the rotation of the curette, to remove the pathological tissues too near

FIG. 3

Curette.

to the internal os to be readily reached in the ordinary traction of the curette and are especially useful in those cases in which a sharp angle exists just below the internal os due to pressure atrophy with excavation or internal laceration of the cervix. Three furrows on the appropriate surface of the hexagonal handle indicate the direction of the cutting blade. The curette is of rigid steel throughout no necessity for flexibility having been encountered.

I wish to preface a description of their use by a few words as to who should use them. Years ago Thomas, Sims and others advocated the curettage of the cervix for chronic endocervicitis and it is constantly done by many to-day, but because of the lack of proper instruments either too much or too little has been done. My first cases were curetted with a tiny ear curette and the results were far

better than with chemical or caustic applications, but were still unsatisfactory because the cervical membrane was not thoroughly removed. Next, before designing my own instruments I used a No. 3 antrum curette with, on the whole, satisfactory results, but the angular shape has rendered the curetting much easier both for myself and through the saving of time for the patient. The increase in length is a particular advantage also. But to revert to Thomas, who says, "We have adopted a plan, in every decided case of this disease, of proceeding at once to the one radical means of effecting a permanent cure." He then describes his method of crucial incision of the external os (in nulliparæ), the removal of the four triangular flaps and the sharp curettage. He further says: "It should be distinctly understood that this treatment is to be looked upon as an operation and is to be performed only at the patient's residence or at some spot where she can be immediately placed in bed, and if necessary to quiet her nervousness or ease her pain, an anæsthetic should be given." Such a formidable procedure is entirely unnecessary as is also either the confinement in bed or the anæsthetic.

While my method of treatment has none of the above characteristics of an operation it certainly does possess certain others. It is an operation. It should not be undertaken by the average general practitioner with but little gynecological skill and with little or no practical working knowledge of the establishment and *maintenance* of asepsis, and is not offered for their use but for the use of only such as are trained in gynecological and surgical manipulations. Its use must be confined to those having sufficient diagnostic acumen to ascertain the exact state of the internal os and with sufficient familiarity with instrumental manipulation to do no injury through too great employment of force and yet to do the work thoroughly. Above all a rigid asepsis of the instruments, vagina, and portio vaginalis is essential. With due attention to this asepsis I have never seen, in three

years of constant and frequent employment of this method, a single case of infection or even of rise of temperature. But I am convinced that a careless, clumsy, or unclean use of these instruments could produce serious if not fatal complications. With this proviso I will describe my technique.

In all my work I have used the Sims position and have operated through the ordinary medium sized Sims speculum and have had the assistance of my office nurse, but, while it would certainly be much more difficult, I see no reason why the dorsal position and bivalve speculum could not be used.

It is my rule never to operate upon these cases without from one to several days of antiseptic preparation of the vagina and portio vaginalis. Efforts at sterilization of the cervical mucosa are impractical and have never been attempted. I have patients use three, two-quart 1 : 5000 formalin douches, moderately hot, in the sitting posture, each day for from one to three days, during which total abstinence from sexual relations is prescribed. All instruments to be used, including speculum, forceps, and everything which will in any way come in contact with the patient, are sterilized by boiling in a 1 per cent. soda solution for six minutes.

When the patient is upon the table the labia are very widely separated, using more retraction than for an ordinary examination, when the speculum can be introduced without coming into contact with the external genitalia. I have never found it necessary to scrub or shave the vulva, but any hairs which project or fall into the lumen of the speculum so as to contaminate the instruments during use are cut away. The vagina is thoroughly scrubbed with a pledget of sterile cotton, a cotton ball saturated with a strongly alkaline solution, of which the simplest and most thoroughly efficacious is a sterile (boiled) saturated solution of sodium bicarbonate. This solution completely removes all mucus and leucorrhœal accumulations and is immediately followed

by a scrubbing with 1:5000 formalin or any equally efficient germicidal solution.

The dilatation is now done, or if it is deemed advisable in the individual case, a few crystals of cocaine may be taken up in the tips of a pair of uterine forceps and deposited upon and just within the external os. Very few patients require cocaine, and many upon whom I have operated without it state that the pain is less than that experienced in having teeth filled. If cocaine is used from two to three minutes should be allowed for the assertion of its action.

Being now ready for the operation itself the anterior outer aspect of the portio vaginalis is grasped with the forceps as near as possible to the external os. The grasp should be deep and firm enough to furnish good counterpressure without danger of tearing out, but care should be taken not to have the teeth penetrate to the lumen of the canal.

The tip of the dilator is then introduced through the external os and against the counterpressure of the forceps is forced home until the shoulder is in contact with the external os. The dilator maintains its position with but trifling pressure. Care must at all times be taken to avoid unnecessary downward traction, as this puts unnecessary strain upon the uterine ligaments and favors subsequent malpositions of both uterus and appendages. Diseases of the tubes and ovaries contraindicating traction and of such a nature as to make any collateral treatment only partially successful should constitute a contraindication to this form of treatment except as an immediate preliminary to the radical treatment of the associated lesions.

The curettement of the cervical canal must be so thorough as to completely remove the cervical mucosa giving the familiar grating sensation felt when the musculature is reached. In proper cases no particular care is needed to guard against passing the internal os. The curettement is concluded by a few rotations of the curette upon its long axis while it is gently pressed against the resistance offered

by the internal os in order to remove the tissues immediately subjacent.

Finally, the cervical canal, now denuded, is antisepticized by the application of iodized phenol to its entire surface, the vaginal vault is filled with powdered boric acid and a 33 per cent. ichthyol and glycerin strip is laid against the os internum and about the portio vaginalis.

The description of this little operation requires more time than its performance.

The patient is permitted to leave the office at once. No aching nor pain has been observed. She is instructed to remove the dressing in from twenty to thirty hours and to resume her daily 1 : 5000 formalin douches for ten days during which time she is to avoid unusual physical exertion and to abstain from sexual relations. She is told to report at the office in from three to five days for observation. No patient has ever reported, although all have been told to do so, any complication. At the end of from five to ten days the cervix has resumed its normal appearance all evidences of endocervicitis having disappeared. Both the long standing swelling and the excessive secretion will have disappeared, unless, of course, some of the increased size was due to actual hypertrophy, in which case its disappearance takes much longer and is seldom complete. Best of all the patient feels well.

In three cases three curettements at intervals of about two months were necessary to achieve a complete cure which now eighteen months after the last treatment seems permanent. In several cases two curettements have been necessary, but these have all been cases of unusual severity and of exceptionally long standing, in all of which the cervical tissues had been more or less unusually destroyed by caustic applications.

Considering how uniformly successful curettage has proved in proper cases of corporeal endometritis in which situation the entire glands, the principal habitat of the

infectious principles, cannot, because of their dipping down into the musculature, be completely eradicated, it is to be expected that in the cervix where the glands are shorter and can be removed the cure should be more prompt and certain and experience proves this view to be correct.

Finally, I wish to state emphatically that this operation is not offered as a substitute for tracheloplastic operations in cases dependent upon laceration nor as a substitute for uterine curettement in cases in which both body and cervix are involved.

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DISCUSSION.

Dr. Howard A. Kelly, of Baltimore.—I am glad to have heard Dr. Craig's paper on endocervicitis, for the reason that there are many women suffering from horrid, nasty discharges, and women who are distressed by reason of protracted sterility, which can be obviated by getting rid of this disease; moreover, the removal of it will undoubtedly obviate the risk of future trouble from this constant local focus of infection which they carry.

Let me say a word or two about endometritis. I fancy I hear the old gynecologists turning restlessly in their graves as we speak of it; but I do not remember to have treated a case of endometritis *per se* for many years. In fact, I do not believe I have ever seen a patient with endometritis pure and simple. I believe it is rare. I have seen many patients with an endocervicitis, a rather common affection, usually gonorrhœal in origin, and these come to my office for treatment. In one I used all kinds of applications and douches, as well as strong solutions of nitrate of silver. Our forefathers used the solid stick of

nitrate of silver to destroy the cervix, converting it into a cartilaginous-like rod; but we have a method now which will effect a cure in these cases in a comparatively short time, and it is as simple as that described by Dr. Craig. The method is to burn out the vaginal cervix with the blade of the Paquelin cautery applied carefully and quickly three or four times in the axis of the cervix.

My associate, Dr. Hunner, devised and used it first in cases of endocervicitis.

The treatment reduces the size of the cervix to the normal. It may be substituted for the operation of laceration of the cervix in many cases.

Dr. Guy Leroy Hunner, of Baltimore.—I consider this one of the most important topics that has been brought before the meeting. During my residency in the Johns Hopkins Hospital, I think no question was asked me more frequently by visiting physicians from all parts of the country than this: What do you do for endometritis? My answer was that leucorrhœa is rarely due to endometritis, but it is usually an expression of endocervicitis. We occasionally find endometritis in the pathological laboratory in uteri that have been removed, especially post-gonorrhœal cases, where the microscope shows foci of infection lying deep in the mucosa. Ordinarily, the uterus has great power for clearing up its infections. I think frequently in gonorrhœal infection there is an ascending infection that goes all the way to the peritoneal cavity leaving the uterus ultimately clear; but the cervix generally has remnants of infection. It has been my idea that this is due largely to the cul-de-sac in the vagina in which the cervix lies and in which the drainage from the uterus accumulates. I think Dr. Craig spoke of the glands of the uterus being deeper than those of the cervix. While the cervical glands are shallow, yet when they become plugged they readily form cysts, the so-called Nabothian follicles. It is with the idea of destroying the dilated and infected cervical glands that I use the method to be described. Originally, we used the method Dr. Craig has spoken of as Thomas', that of crucial incisions, but I noticed in watching these patients that they had just as much leucorrhœa as ever after the incisions healed. Later we used the method of the Paquelin cautery, whirling it around over the cervical mucosa, causing a slough of the

superficial mucosa, so that when the slough healed it had not relieved the deeper infection. I simply combined these two methods, taking the Paquelin cautery and making deep radial incisions. The patient lies in the dorsal position, the cervix is grasped with a tenaculum and exposed by the insertion in the vagina of a Sims speculum. The only disinfection I use is to dry the cervix and upper vagina and then swab this region with a pledget soaked in 10 per cent. silver nitrate solution. The cervix is drawn down toward the vulva and with a hot cautery blade four to six deep radial strokes are made covering, in a vertical direction, all the cervical mucosa in sight. In a lacerated cervix this sometimes means that the cautery extends as far up as the internal os. Three weeks' time is given for the sloughing of the tissues and healing of the scars, when the treatment is repeated. From three to ten treatments have been given in individual cases, the chronic gonorrhœal cases requiring the most persistent efforts. In case of painful cervical scar, I sometimes use a pledget of 10 or 20 per cent. cocaine for a few minutes before the treatment, but, as a rule, no anæsthesia is necessary.

My paper fully describing this method will appear in a few weeks in the *Journal of the American Medical Association.*

Dr. Craig (closing).—I have very little to add except to say a word or two in reference to what Dr. Hunner has said on this subject. I regret very much that I did not have time to read all of my paper, because some of the points Dr. Hunner brought up will be found in the paper, especially with reference to the pathological aspect of the question, and the dipping down of the glands, which he speaks of in chronic cases. Those are the cases which have occasionally required a second or even third application of this treatment.

I am a little bit inclined to disagree with Dr. Hunner that in a good many cases this inflammation is closely confined to the external os. Pryor said in his book that the cause of endocervicitis is always laceration of the cervix or gonorrhœa. I think that is putting it a little bit arbitrarily. There are probably other causes of endocervicitis; some other forms of infection may be active at times. And especially do I disagree with Dr. Hunner in those cases where there is a chronic irritation of the cervical mucous membrane, accompanied by a thick, nasty,

disagreeable discharge, due to what we have learned to call incomplete laceration of the cervix, so that we get a pouching and excavation of the cervix itself without any manifest fear on the outside. In these cases I have repeatedly examined the sections removed with my curette and have purposely gone clear of the region adjacent to the external os and made my first removal of tissue from the tissues immediately subjacent to the internal os, and I have found typical plugging of the glands with the lining layer of columnar epithelium almost transformed into stratified epithelium, with the glands completely plugged and all the manifestations of the pathological condition which we so frequently find at the external orifice, and in those cases probably either a tracheloplastic operation would be necessary to complete that work, or else the cauterization would have to be very deep.

Dr. Hunner.—The cautery goes to the internal os.

Dr. Craig.—I laid great stress upon antisepsis in my paper, for the reason that I do not want to promulgate this method of treatment, so that it may be used indiscriminately by men who do not seem to understand the value of asepsis when a raw surface is exposed to infection. I think very likely my directions in the way of asepsis and antisepsis have been unnecessarily elaborate, but still I do not feel that I have ever done a patient any harm by it, and I am sure if men will follow the plan I have carried out they will not get into trouble. I strongly insist on a thorough antiseptic and aseptic technique in doing this work.

A CASE OF FRACTURE-DISLOCATION OF THE LOWER END OF THE FEMUR.

By George Summers Brown, M.D.,
Birmingham, Ala.

R. D., aged fourteen years, white, was injured in a football game at a small college on November 14, 1904. He was carried to the school, where the village doctor examined him and pronounced the injury a sprain of the knee. He was nursed for twelve days, cold applications being kept applied constantly, but with little or no relief from the pain. He was then brought to Birmingham and placed under my care at St. Vincent's Hospital.

Upon examination no fracture could be made out. The knee was uniformly swollen, hard and œdematous, but with seemingly little fluid in the joint. A skiagraph was not taken, as there was no apparatus in the institution and the patient and his friends objected to his removal elsewhere. The joint was put up temporarily in plaster. As there was no crepitus and no more deformity apparent than seemingly might be due to the swelling, we made the same mistake the first doctor did and regarded the injury as a sprain. The patient remained two weeks and then became discouraged and was allowed to return to his home. The pain at this time was entirely relieved and he did not suffer at any time afterward except from manipulation. He returned to me on January 15, 1905. At this time he was walking with a very bad limp and with the aid of a cane. The leg was flexed about 20 degrees from the perpendicular, was

in pronounced valgum with a decided backward luxation on the thigh.

Efforts made to reduce the luxation only seemed to increase it. A skiagraph taken at this time shows a fracture-dislocation of the lower end of the femur. The picture shows the fragment dislocated backward and to the inner side of the broken shaft; the periosteum has been stripped up from the under side of the upper fragment and shows bony deposit between it and the femur. Through this bony deposit union had taken place between the fragments in this deformed position.

He remained in the hospital at this time about three weeks, and then he was allowed to go home for a while to see how much his walking would improve and with orders to report every week or two.

He was walking with a cane and was free from pain, but with a very bad deformity and limp.

After this the limb got stronger all the time and he could walk a good distance every day without causing him any distress at the time or afterward, but the limp and the deformity remained the same. After several months of this stand-still condition we decided to perform an open operation for the correction of the deformity. This was done on June 12, 1905, in the following manner. A longitudinal incision four inches long was made over prominence of the lower fragment on the inner aspect of the thigh, the lower end of the incision stopping short of the level of the knee-joint. From the middle of this and at right angles to it another incision two inches long was made to the upper edge of the patella. Cutting down through fascia lata and internal lateral ligament the periosteum was exposed well above the joint. By splitting this and dissecting it back the line of bony union between the fragments was exposed. This was chiselled through. Still working subperiosteally the lower end of the broken shaft was exposed and about a third of an inch of it sawed off. About a third of an inch was removed

from the separated condyle, then allowed the leg as a whole to be brought forward on the thigh and the luxation to be reduced.

The condyle was anchored to the shaft by one heavy suture of silver, the periosteum was sutured with catgut and the lateral ligament with kangaroo tendon. The skin was closed with a subcuticular of silkworm gut.

A small drain of silkworm gut was left at the junction of the two incisions, the limb put up in plaster and suspended in a Hodgen splint. The oozing was pretty free and in consequence of leaving the first dressing on a little too long there was slight infection at the point of drainage. This, however, lasted only a short time, did not reach any of the buried sutures nor interfere with the bone union. The patient was walking about in seven weeks after the operation. A skiagraph, taken just before he left the hospital, showed the bone and joint in good position. There was about half an inch shortening when he left, and as he is still growing this will be increased to some degree, because that bone cannot grow any more from that end. The limb was perfectly straight when extended, but motion was limited somewhat when effort was made to flex the leg on the thigh. Since writing the above I have heard from him in the last few days, and he reports that he can bend his leg almost as much as before the injury, that he has discarded his cane, and that as far as he can tell his leg is as good as it was before except for the slight shortening.

However fortunate the outcome of this case, the patient suffered much from erroneous diagnosis. Such a case falling into the hands of an experienced surgeon immediately after the injury I believe should be aspirated at once if the joint is distended with fluid. Aspiration would answer three very important purposes: It relieves pain; by emptying the joint, manipulation would be so facilitated that such a fracture as this would never escape discovery, and in most cases could be reduced by manipulation without any trouble

at all; and finally, aspiration will nearly always prevent adhesions within the joint afterward. The effusion into the joint even after a simple sprain is very often, in large part, blood, and this is prone to organize into adhesions. Someone has recently estimated that more than 50 per cent. of all sprains of the knee-joint result in permanent injury. These permanent injuries are made up of undiscovered fractures, dislocated cartilages, and overstretched ligaments; but many or all of these are probably complicated by the adhesions formed by the organized blood that was poured out at the time of the injury and in a few cases the disability may be due to the blood alone. Of six cases of sprained knee that I have aspirated all contained blood and all dated their improvement from the time the operation was done, and I believe that all of them made complete recoveries. One man had been in bed for three months with a swollen knee, which made no progress at all toward recovery. Six ounces of pure unclotted blood was removed by aspiration, and he was walking about the next day. One other patient, with every sign of a severe sprain, rapid swelling, discoloration, and excruciating pain, was aspirated four hours after the injury and his leg put up in plaster. He never had the slightest trouble with it afterward, though on account of a sprain of his ankle on the other side he did not get about for three weeks. In the case of this fracture-dislocation either aspiration or the *x*-ray would probably have cleared up the diagnosis, but reduction of the fragments after the lapse of twelve days might not have been possible without the open operation.

DISCUSSION.

Dr. Robert Carothers, of Cincinnati.—I do not think this paper should go by without a word or two. I wish to compliment Dr. Brown on the case he has reported and on the result.

There is just one point I want to make in reference to sprains. I really think that a mistake we make in the treatment of sprains

is in treating them too well, making efforts to confine the patients too much. I have had considerable experience in treating sprains of the ankle-joint, and it is my rule now never to take a person with a sprain of the ankle off the feet. I make them go right along from the moment I apply a dressing of adhesive plaster, and I use this all the time and nothing else. I condemn the use of plaster-of-Paris in sprains of the ankle, and I think the same principle can be worked out with regard to other joints, although I am not prepared to say how that can be done.

Dr. Horace J. Whitacre, of Cincinnati.—I have gone through an experience similar to the one described by the essayist, in a case of oblique fracture, with much more extreme dislocation, so that the anterior or upper fragment was beneath the epidermis. I operated on the patient within a few days after the occurrence of the accident, and we found difficulty in retaining the fragment in position. Kangaroo tendon sutures were used for holding the bone in position; but I noticed by subsequent *x*-ray pictures that this bone slipped somewhat, even though the leg was put up in a position to relieve it from strain, it is now in a slightly deformed position. The bone has slipped, but the functional result is good. I think this contribution is a valuable one.

Dr. William Perrin Nicolson, of Atlanta.—I wish to say a word or two on the general principle of the operations for united fractures. I have never understood why the profession has gone back to the use of kangaroo tendon and chromicized catgut for holding bones together. I have been burying silver wire in bones for years, and have never yet seen the least trouble from it. You have no danger of the ligature being absorbed, and I am at a loss to understand why there is so much prejudice against silver wire in these cases.

The case of Dr. Whitacre of absorption of the kangaroo tendon probably is one in which, if silver wire had been used, it would have remained permanently or at least until there was the formation of strong callus.

I think Dr. Brown's case is a very instructive one. I was especially interested in his description of the condition found in reference to sprains of the knee-joint. I have seen nothing upon that subject in the literature. The aspiration of the joint and removal of a large amount of blood is practically new to me.

His results have been good from that method. In sprains of the knee I did not know there was so much effusion of blood into the joint cavity, and I am rather inclined to think that in these cases there is an increased amount of synovial fluid, and not hemorrhage, into the joint. The result has been very good, and it encourages us not to hesitate in non-union of bone to go in and correct the deformity.

I would certainly urge the use of silver wire instead of absorbable ligatures or sutures. I do not believe silkworm-gut is justifiable. Dr. Noble spoke of silkworm-gut staying in in ten thousand of his cases, and in only six was it disturbed. I am inclined to think his experience is unusual.

Dr. W. P. Carr, of Washington, D. C.—With reference to silver wire, I have used it in a great many cases of fractures in various parts of the body and I have seen no harm from it. Personally, I do not see any reason for using any other suture in bone. I have wired patellas with silver wire without any trouble from the suture material. I have wired at least forty fractures of the femur and have never had any trouble from silver wire, and I never use anything else. I think it is a mistake to use absorbable material, because in many instances union is delayed for a long time, and I have seen several cases in the hands of other surgeons where kangaroo tendon was used and absorbed, with the result that the bone got out of place again. This is apt to be the case in fracture of the patella.

The case of Dr. Brown is instructive in another way, in that it shows the difficulty of diagnosing a fracture near the knee-joint. I have had a number of cases in the Emergency Hospital in Washington of fractures close to the knee-joint, either in the upper end of the tibia or the lower end of the femur, and I have been unable to diagnose them in many instances by palpation and examination. I felt crepitus and knew the bone was broken, but could not tell just where. I do not feel that I can tell in many cases whether there is a fracture or not about the knee until I have an *x*-ray taken or cut down on it. One condyle may be broken off and simply turned around, rotated on its axis, not displaced in any other way; it may be impossible to detect such a fracture with the hand, although one would think it easy, because there is so little soft tissue over it. Therefore, I think it ought to be a routine practice to take an *x*-ray picture

of every serious injury to a knee, and especially where crepitus is felt, or where there is effusion or infiltration into the tissue. The swelling in most cases is not fluid that can be aspirated, but simply œdema of the connective tissue around the joint.

I want to urge operation in these cases when there is difficulty in keeping the bone in place. I think it important, as in many cases it is the only way by which the bones can be got into proper position, even when seen immediately after the accident. There is often no way of keeping in place short fragments and keeping them from rotating on themselves except by wiring or fastening in some way by operation. In my experience silver wire has always proved efficient and gives no trouble.

Dr. Charles M. Rosser, of Dallas.—I want to call attention to a plan I have recently been using in cases of united fracture, the use of a silver plate with screws (Halsted method). One point in its favor is the great ease with which it can be applied. I simply resect the periosteum, making such resection as may be necessary, and that is necessary in cases of ununited fractures, take a plate just long enough with four holes in it so that the silver screws can be inserted, two on one side and two on the other of the break. I found it very successful in instances tried, care being used to conserve the periosteum; you can incise the point and lift out the plate if troublesome. The plate often remains by the femur and gives no trouble. The plate is made thin and the silver screws can be adjusted easily. The first one I used was sent to me by Dr. Finney, of Baltimore. After that I had a local silversmith make the plate for me.

Dr. James B. Bullitt, of Louisville.—In regard to the material to use in these various kinds of bone operations, as Dr. Carr has said absorbable material has its advantages, but it has also its disadvantages. I think silver wire has its disadvantages too, and the remarks of Dr. Rosser indicate the disadvantage of using silver wire. It is impossible by external application to keep the bones in line when silver wire is used.

The first case of interest I wish to mention is one in which a bone plate has remained in place for three years in a case of ununited fracture of the femur, and it has caused the man no trouble.

A second case was operated under local anæsthesia; both bones of the forearms were previously operated by another surgeon,

who used silver wire for suturing. It was impossible in the first place to so splint the arm as to prevent the angulation which took place after silver wire was used; second, there was lack of union; and third, there was a sinus leading down to both wires. Under local anæsthesia we applied two plates, one to each bone close up to the joint two and a half inches from the elbow and removed them subsequently by means of local anæsthesia. This patient has very slowly, but gradually, acquired solidity in both of these bones of the forearm.

The silver plate has great advantages; most of the plates will come out, and it is an easy matter to get them out.

Dr. F. W. Parham, of New Orleans.—I would like to call attention briefly to the advantage of mechanical extension in the treatment of ununited fractures, as carried out in the Charity Hospital at New Orleans. The patient is put into the apparatus (Lorenz redresseur) and the operation carried out with the extension ready to be applied. The bones are exposed; overlapping is broken up by manipulation, resection or otherwise, and the bones simply pulled into place by applying the extension. The soft parts are sutured with absorbable material, the dressings put on and the whole plaster-of-Paris bandage applied before the extension is released. In this way coaptation may be accomplished and maintained in many cases without resort to direct suture of the bones or the use of other mechanical contrivances.

Dr. John D. S. Davis, of Birmingham.—I wish to congratulate Dr. Brown on the excellent results he obtained in his case. I want to put on record a case which illustrates the difficulties of diagnosis of fractures just above the knee-joint.

A stout man, an architect, sixty years of age, fell from the third story of a building, sustaining two fractures of the thigh, a fracture of the anatomical neck, and a T-fracture above the knee-joint. It was the only case of T-fracture of femur I have ever seen. When I was called to see the patient and treat him, a few hours after the accident, there was considerable swelling around the knee and I overlooked the fracture of the knee-joint. Leg was dressed in plaster-of-Paris. I cut the plaster at once and suspended the leg. On the fourth day thereafter I opened the plaster and examined the anterior portion of the leg; the swelling had subsided very much, but I did not think there was a fracture, but simply a sprain of the knee-joint. At

the end of eight weeks the plaster was removed and fracture above the knee-joint found. Had it been removed in four or five weeks for examination and massage, as is my custom, the fracture would have been detached earlier. I insisted on having the patient brought to my infirmary so I could make an *x*-ray picture, because the condyles had considerably widened, more so on the inner side than on the outer, and I suspected a T-fracture, although the condyles had united. He insisted on being dressed at his residence. He was put under an anæsthetic and it was impossible to get crepitation, on account of the lower fragment piercing the biceps at the bifurcation. He was later taken to my infirmary and an *x*-ray demonstrated this fact. I cut down on the external side and put in a Halsted plate, which has still been retained and has not given any trouble.

Another interesting point with reference to this case is that about the ninth week after he left my infirmary, he got into a bath-tub without an attendant, and in attempting to get out, his foot slipped and he fell across the bath-tub and sustained a fracture at the juncture of the middle and upper third. This was treated with the same character of plaster dressing, with good results, and he has no shortening save that equal to the small amount of bone which was removed at the lower line of fracture. He is using the limb; the plate is still in.

As a method of closing or uniting fractures, I think the Halsted plate is one of the best. I think in Dr. Brown's case I should have used silver wire.

Dr. Horace J. Whitacre, of Cincinnati.—I am sorry to have to ask the privilege of the floor a second time. I abandoned silver wire for the reason that *x*-ray demonstration, carefully made after its application, showed a very early rarefying ostitis, a liquefaction of the bone, so that silver wire in a short time (within two weeks) was entirely extruded from the bone. In certain cases silver wire has given me trouble and has had to be removed. Dr. Parham has given the gist of my ideas on this subject. The use of extension properly applied with chromicized catgut, or kangaroo tendon, will usually answer every purpose. I never use silver wire in fractures of the patella, but simply non-chromicized or chromicized catgut, in the prepatellar aponeurosis and have obtained perfect results. For this reason I use absorbable sutures instead of silver wire.

Dr. F. W. McRae, of Atlanta.—There is one method that was used by the late Dr. Parkhill, of Denver, Colorado, which has not been mentioned, and which has a field of usefulness in the treatment of these fractures under discussion. Dr. Parkhill reported the best results of any man who has made reports on this class of cases.

In the cases of ununited fracture I have treated I have uniformly used silver wire, and I have gotten good results.

Dr. W. P. Carr, of Washington, D. C.—When I hear a surgeon talk about the trouble with silver wire, I think he does not use it properly. It is not necessary to put wire through the entire thickness of a bone. It is easy to keep the leg or any long bone straight. We only want something to keep the bone from slipping out of place, sideways or overlapping. Dr. Shands frequently puts a drill in the bone and leaves the end sticking out through the wound. In the course of two or three weeks the drill will loosen and can be taken out. I do not like that so well as we have an open wound and there is a small sinus which may persist for weeks. While it does not amount to much I would rather close the wound and have it unite primarily. I have used silver wire for ten years. I have employed it in a thousand cases without having had to take out a piece unless the wound suppurated. I have *x*-ray pictures of femurs that have been united in this way, showing plainly a little silver wire loop. I do not believe silver wire changes unless there is some infection, and if rarefying ostitis occurs around the silver wire, it must be due to some slight infection.

Silver plates and screws are more difficult of application than silver wire. I use a small drill which I can manipulate with one hand, so that I can hold the end of the bone with the other hand. We do not want a large hole. Do not wrap wire around a bone nor drill holes through the entire thickness of the shaft. If you do the wire *may* cause trouble.

Dr. Brown (closing).—I seemed to have been a little unfortunate in the title of my paper. The advisability of open operation for the correction of vicious union in bone might have been a better title, because the discussion drifted off into the treatment of ununited fractures.

I think the interesting point in my case was the fact that after the lapse of several months the operation was successfully

done without opening the joint. Although I went into the case fully expecting to open the joint, I thought I could save the joint if I did not have to resect it. In reading my paper I condensed it too much and on that account was unable to bring out one or two points as fully or distinctly as I should have done.

I wish the gentlemen who discussed the paper had taken up the subject of immediate radical treatment of these bad fractures about the knee-joint, because I am fully convinced we are justified, after making a correct diagnosis, in emptying the joint of fluid. I think that is of great importance. This answers the double purpose of making the diagnosis and instantly relieving the pain. In the cases I have aspirated the results have been instantaneous, and I believe I said I withdrew about a pint of blood; I should have said bloody fluid.

Someone, whose name I cannot recall now, has written a good article on the subject recently in von Bergmann's *Surgery*, in which he states that in a great many cases there is a bloody effusion which results in fibrous union of the joint, and that in perhaps 50 per cent. of all so-called bad sprains the joint is permanently injured, many of them being due to this cause alone. I do not think we can have a bad fracture without having bloody effusion in the joint, and wherever there is a fracture it strikes me that aspiration is indicated.

THE TECHNIQUE OF APPENDECTOMY.

By W. P. Carr, M.D.,
Washington, D. C.

No disease presents more varieties and more grades of severity than appendicitis. There are all shades between a mild catarrhal attack and a severe gangrenous case with diffuse peritonitis. It is therefore apparent that no one method of operating will suit all cases. We must modify the technique to suit the case and the strength of the patient. In my first hundred cases I had eight deaths. In my last seventy-two cases I have had but two deaths, and I believe the improvement was due to a fuller knowledge of the condition of the patients and a suitable adjusting of the technique to those conditions.

For practical purposes we may put all cases of appendicitis into four classes, as follows:

1. Unruptured, uncomplicated.

2. Unruptured, complicated by other serious disease, such as nephritis, tuberculosis, or myocarditis.

3. Perforated or ruptured—first thirty-six hours. Patient in good general condition.

4. Perforated or ruptured—after thirty-six hours. Complicated by diffuse peritonitis or by asthenia from long illness or by other serious disease. Patient in bad general condition.

The first class includes cases of catarrhal appendicitis, chronic and recurrent cases in which the appendix is not perforated, and there is no pus around it.

The technique presents no difficulties, and is usually carried

out in a satisfactory manner. There are certain points, however, not always observed as they should be.

The incision should always be either the gridiron or through the rectus muscle, otherwise hernia is very likely to follow.

There is but one objection to the gridiron incision—it cannot be greatly enlarged without cutting across the fibre of the internal oblique and transversalis muscles. This should never be done. It is better to close the wound and open again through the rectus muscle if a very large opening becomes necessary. However, if this incision is well placed it may be stretched by the fingers, and a fairly large opening made through which any uncomplicated operation may be done. The stretching should never be excessive, as paralysis of the stretched muscle fibres may result and hernia follow.

The proper placing of the gridiron incision is therefore important. The opening should be just above the junction of the appendix to the cæcum, because the cæcum may always be lifted upward, to a greater or less extent, but cannot be pulled downward, and the very act of lifting the cæcum out of its bed carries it cephalad. The tender point usually corresponds to the base of the appendix, and is a fairly good guide for the incision. If, however, it be found that the cross-incision, or rather the cross-separation of muscle fibres, is too high or too low, then the separation of the internal oblique and transversalis may be closed with a few catgut sutures, the external oblique split further up or down, and a new separation of the internal muscle layers made at the proper point. In this way nearly all cases may be successfully managed, with no danger of hernia.

In women chronic appendicitis is frequently associated with disease of the uterine appendages. In such cases an incision through the rectus muscle is preferable, as the tubes and ovaries of both sides may be reached by enlarging the wound slightly in a downward direction.

The appendix should always be cut off close enough to the cæcum to invert easily, otherwise it may be simply pushed

down under the peritoneal coat without being inverted, and form a serious menace to the patient's life, when the abdomen is closed without drainage.

In the second class of cases, unruptured appendix complicated by other serious disease, the most important point in the technique is the saving time. Such patients may often be kept safely under ether for fifteen minutes, when they would not stand it for half an hour.

In such cases everything should be ready in the operating room before anæsthesia is begun. The patient should be put upon the table as soon as he is unconscious, and the final cleansing and arrangement of sheets and towels made while the anæsthesia is being completed. Incision through the rectus muscle is better here, as it may be made and closed more rapidly than the gridiron incision, and affords more room.

The third class includes all cases of perforated appendix not complicated by other serious disease and operated on not later than thirty-six hours after the beginning of the attack.

Regardless of the actual pathological conditions found, such cases undoubtedly do better when operated upon within twenty-four hours.

A case operated upon say on the fourth day may present no worse gross lesions than another on the first day, but his chances of recovery will be much less and his case will require a different technique. I put thirty-six hours as the limit for comparatively safe operation.

In the third class no time should be wasted; but time should be taken, and may be safely taken, to do thorough and complete work. The incision should be through the rectus muscle, as this gives more room for thorough work. After opening the abdomen, if the pus is walled off the intestines should be pushed aside and protected as well as possible by gauze sponges, while the abscess is being evacuated. This should be done rapidly, with large sponges. After the cavity is wiped out my method is to pour into it a half-pint of hydrogen dioxide. I believe this cleanses it more thoroughly

and quickly than can be done by mechanical means. The appendix is then removed and the stump inverted, if possible. In many of these cases, however, it is impossible to invert the stump on account of its thickened friable condition, or on account of the same condition of the cæcum. In that case the stump is simply ligated with catgut or silk. The gauze sponges are then removed and any part of the peritoneum or abdominal viscera that may have been contaminated by the pus carefully wiped clean with gauze sponges wet in salt solution.

The next step, which I consider of great importance, is the breaking up of all adhesions, removal of infected masses of lymph, a search for other pus cavities and other lesions, such as gangrenous spots on the cæcum, folds of intestine that may have been in contact with the appendix, thrombi in the mesenteric veins, or thickened and infected omentum.

In several cases after evacuating a walled-off pus cavity I found a second collection of pus, and in one boy this pus was found on the opposite side in the pelvic cavity. In another recent case, a child, the pus cavity had a small channel running from it alongside the rectum almost to the anus, which would undoubtedly have been overlooked had not the adhesions been separated. One of my early cases was lost by leaving a mass of infected omentum in the wall of a cavity that I was afraid at that time would break down. Another case was operated upon a second time, after three years, because I had left about half an inch of the appendix buried in the wall of the cavity. I thought I had removed the whole appendix at the first operation, but left the last half inch of it buried in the adhesions. At the second operation a fecal concretion was found in this stump, and a perforation. All adhesions were fortunately separated this time, for I found a second collection of pus to the right of the umbilicus that would otherwise have escaped detection.

Drainage is necessary in such cases, but if the drain is made through the incision the percentage of hernias will be considerable. This may be obviated by puncturing

with a pair of scissors the thick muscles of the flank an inch above the middle of the crest of the ilium and draining through this puncture. An incision, one inch long, should first be made through the skin, and the opening should be dilated until it will admit a drainage tube as large as the thumb, as well as the ends of gauze strips that have been packed around the stump and the infected area in the abdomen. The abdominal wound may then be closed.

I am convinced from my experience that such drainage is just as efficient as if the whole abdominal wound were left open and packed. The large drainage tube should be removed after forty-eight hours, and then the gauze, which will come out readily through the large space, previously occupied by the drainage tube. The drainage tube should be at once cleansed and reinserted. By this time the packed area will be well walled-off and it will be unnecessary to reinsert gauze.

In some very acute cases no adhesions will be found and the general peritoneal cavity will be filled with dirty infected fluid, sometimes containing particles of fecal matter. When this condition is found, I believe that the abdominal cavity should be thoroughly flushed with three or four gallons of salt solution through a rubber tube, at least half an inch in diameter, without a nozzle. The end of the tube should be carried up to the diaphragm, down into the pelvic cavity, and over to the opposite side of the abdomen, and the water allowed to flow back from these remote parts to the wound, carrying the infected material out, and not forcing it into the more distant parts.

Drainage through the flank will be found efficient, and the abdominal wound may be closed.

Cases of the third class, treated in this way, make rapid and uneventful recoveries; but if thorough work is not done, dangerous complications frequently occur.

In the fourth class this thorough work is not possible. Patients who have had diffuse peritonitis, or even large

localized pus collections around the appendix for several days, or perhaps for several weeks, will usually die if kept on the table more than fifteen or twenty minutes. They do not always die on the table under prolonged operation, but frequently seem to do well for twelve or twenty-four hours, and then go into collapse, from which no treatment can rouse them. In some of the more extreme cases we must do all that is to be done in five or ten minutes, if we hope to save the patient. Here, again, it should be seen that everything is ready and in place in the operating room before the anæsthesia is begun. The patient should be placed on the table as soon as unconscious, and the final cleansing and arrangement of towels, etc., done while the anæsthesia is being completed. In the more extreme cases nothing should be done except to open the abscess cavity; and in very extreme cases, with pulse of 160 or more, this should be done in from three to five minutes by cutting straight through the abdominal wall right over the appendix. The incision should be only one or one and one-half inches long, requiring no sutures, and the anæsthetic should stop as soon as the cavity is opened. It is not necessary to evacuate the pus or hunt for the appendix, but if the patient's condition seems to warrant it and the appendix can be easily found, ligated and removed, it should be done.

I believe that a patient in the first twenty-four hours of appendicitis, with a pulse of 130, may, as a rule, be safely kept under ether three-quarters of an hour, and that ought to be long enough to finish a complete operation. But a patient with a pulse of 130, after the third or fourth day of the attack, cannot be safely kept under ether more than twenty minutes.

My object in writing this paper is to try to classify the various types of appendicitis and formulate some general rules as to the kind of operation suited to each class. I shall be glad to have some expression of opinion from this Association as to the correctness of my deductions.

DISCUSSION.

Dr. George S. Brown, of Birmingham.—I want to discuss for a moment the question of hernia following suppurative cases of appendicitis. It would seem that in a certain section of our country we get a great many suppurative cases of appendicitis, for out of 125 cases of my own more than three-quarters of them were pus cases. As a striking contrast, about a month ago I saw Dr. Mayo operate on twenty cases of appendicitis, eighteen of which were clean. In these pus cases I have had only two in which hernia followed operation. Those were bad cases of diffuse peritonitis. We made a large incision and left it open. I have operated on a good many such cases and it is my rule now to close the wound, with the exception of the space occupied by the drain.

I have been struck with one thing, and that is this: If you use silk, catgut, or any permeable material, the stitches will suppurate every time. I recall one case in which I have had to take out silkworm-gut on account of the wound breaking down, and that, too, with pus flowing over them, and not mild, odorless pus, but gangrenous pus. There was no redness about the stitches. We dress the wounds and try to keep the stitches clean. The sutures do not suppurate unless the suture material is permeable wire. Germs cannot enter it, and the tissue cells keep the silver wire and Pagensticher linen equally as good as silkworm-gut. The micro-organisms cannot penetrate them and the tissue and blood cells are able to keep the surfaces of such material clean, and wounds closed with them as a rule do not break down even though the pus from the draining open portions is constantly bathing it. Hernia will rarely result from the inch or less of the wound occupied for a few days by the drain. I have had no case of the partially closed wound breaking down.

Dr. William Perrin Nicolson, of Atlanta.—There are a great many points in Dr. Carr's paper that I would like to talk about and with some of which I take issue. In the first place, while it is commonly done, I never make any incision or incisions through the rectus muscle. The mere fact that in making a puncture wound under the spinous process of the ilium shows that it is the natural point of drainage in the average appendix

case, so I have for a number of years made my incisions closely under the spine of the ilium through the muscles. I never use the gridiron incision when I am to operate on an acute case, that is, nine hours after the inception of the disease, but I make an incision where I am going to establish drainage. As Dr. Brown has pointed out, we may easily close the large part of the wound, leave the silkworm-gut or other sutures there, and the point he made of it not becoming infected is true. The lower angle of the wound can be left open for drainage.

Another point the essayist mentioned which I should oppose is the tying of the stump of the appendix in an acute case with silk. It is true, in a large number of acute cases the silk will cut through and come out, forming a fecal fistula for a short time, but I recall a case once when an assistant handed me silk and I thought it was catgut, and I tied it, and remarked I was satisfied it would come out in a few days anyway, but it did not do so, and that silk suture worked out of the infected tract eight months after operation. I never tie the stump of the appendix with anything but plain catgut.

As regards drainage, I believe that the natural line of drainage is toward the iliac fossa, and in working toward it, you are working with the intestines away from you, and through the rectus muscle in the majority of cases you go from the intestines to the right to catch the appendix. So I believe good results are obtained by making the incision farther up. In chronic cases I make my incision about one inch inside of the spinous process of the ilium. I have in the last sixty or more cases gone back to the old method of cauterizing the stump with carbolic acid or actual cautery, and dropping it back into the peritoneal cavity. An article was published in the *Annals of Surgery* in 1903, by a Cincinnati surgeon, in which he demonstrated that of all methods that is the safest and quickest of handling the appendix. When you tie it, the mucous membrane curls up inside and the cæcum is cut off in that way.

As to Dr. Carr's thirty-six-hour limit in operating on these cases, so far I have never seen an acute appendicitis from which the patient died where an operation was done within forty-eight hours from the beginning of the attack. The secret of it is, no matter how violent the local infection, the blood has not become saturated with bacteria, and nature is still able to take care

of the local condition if we get rid of the gangrenous appendix. The ideal time is twenty-four to thirty-six hours. A safe limit is practically as far as forty-eight hours, but after that time the case becomes increasingly dangerous.

This question has so many aspects that the surgeon has to work out some of them himself and apply them to the case in hand. Good results are obtained by following different methods.

Dr. John D. S. Davis, of Birmingham.—I wish to endorse what Dr. Nicolson has said with regard to cauterization of the stump in cases of appendicitis. We have treated a very large number of cases in that way. If the mucous membrane is cauterized with carbolic acid in about forty seconds it destroys the mucous membrane and the action of the acid can be limited by following its application with the use of alcohol. More recently I have followed the invagination method of Dr. Kelly, turning the stump in with a puckering suture. This method has proved satisfactory.

I cannot endorse the statement made by Dr. Brown that most of the cases we see in our section of the country are suppurative; there was a time, say ten years ago, when the majority of cases we saw were pus cases. When we were called by telegram in those days we usually found either a suppurating appendix or a perforated appendix. But in that district, physicians have become better educated, and now the majority of our cases are seen between the attacks. I operate on five cases to-day without suppuration where I operate on a suppurating case.

Dr. Carr (closing).—In ligating the stump of the appendix I use catgut. I usually leave the catgut long, bringing it out from the wound to anchor the stump.

I have seen many hernias following operations for suppurative appendicitis. I have had quite a number of my own cases come back to me with hernias, and I have seen numbers of cases from other cities, New York, Boston, Baltimore, with large hernias as the result of an operation where the wound has been packed. I think something like 25 per cent. of the cases of hernia will occur not at once, but some time within ten years after operation. We can prevent these hernias by closing the abdominal wound and providing drainage through the thick muscle above the middle of the crest of the ilium. It does not take more than a minute or so to make an opening, and insert

drain. It matters not what sort of incision is made whether through the rectus or a gridiron incision, if drainage is used in there there is danger of a hernia sooner or later. Sometimes it takes years for the adhesions to become absorbed or break away, when the hernia will come. We ought to use an incision through the rectus muscle for the same reason that we use a gridiron incision for the other. I have operated on some of my worst cases through a gridiron incision; but I would not do it deliberately. I did not suppose they were so bad until I got started. But it shows what can be done through this incision. If that incision is made at the proper place, right over the appendix, and the case is uncomplicated, there is no trouble in operating in this way. If one becomes accustomed to making the incision through the rectus muscle, it is no more difficult than to do the work through a median incision, and one can operate quite as well.

CÆSAREAN SECTION NECESSITATED BY OBSTRUCTION OF PELVIS BY RIGHT HALF OF BICORNATE UTERUS.

By George Summers Brown, M.D.,
Birmingham, Ala.

Mrs. P., aged thirty years, white. Has always been in good health. Was married ten years ago and has been pregnant four times. With the two first she had prolonged labors but successful deliveries without the use of instruments.

With the third the labor lasted thirty-six hours during the last eight hours of which time there was prolapse of the cord resulting in a dead baby. During the fourth and present pregnancy she felt very well up to the end of the sixth month. During the next two months she had four or five hemorrhages, two of them profuse.

Shortly after the end of the eighth month and after the last hemorrhage she was sent in from a neighboring town with a diagnosis of placenta prævia.

An examination revealed a soft boggy mass filling the pelvis almost to the pubic bone. It could not be felt above because the pregnant uterus kept the abdominal walls too tense to enable one to palpate so soft a mass as this through them.

To the finger in the vagina the mass seemed to be inside the uterus. It seemed so plain a case and there being some liability to infection in the hospital at that time she was sent out after a very superficial examination and advised to stop at a near-by boarding house for a few days until wecould take her in and deliver her; the diagnosis being

concurred in that it was undoubtedly a case of placenta prævia.

Owing to the fact that she was reported, every day as doing well, other work was given precedence from day to day until labor came on two weeks after I first saw her. She was at once brought to the hospital and preparations made to deliver her as soon as possible.

It was noticed that the fetal ovoid was almost entirely on the left of the median line, but we failed to account for it and did not give the matter much attention, the patient being, as we supposed in imminent danger of hemorrhage. On examining per vaginam (after thoroughly cleaning and using gloves) it was found that the os readily admitted two fingers. Instead of finding a placenta however, the mass seemed to be outside the uterus. Again feeling in the posterior vault of the vagina the mass seemed to be in the uterus. Upon introducing the whole hand into the vagina, putting two fingers into the os and the thumb behind the uterus, it was clear that as high as I could feel the tumor was in the uterine wall. Indeed the whole lower segment on the left side and behind seemed to be uniformly thickened to the extent of almost filling the pelvis. The stethoscope now being used for the first time the placental souffle was located two inches below and one inch to the left of the umbilicus. It seemed so clear that the tumor was a sessile fibroid that we did not think it worth while to annoy the patient (she having very hard labor pains continuously) by making her get in the knee-chest position. The labor pains continued to be severe all night and she was given three large doses of morphine in the effort to mitigate them, as it seemed inevitable that a section would be necessary. At ten the next day the cervix was fully dilated but the head did not engage and the waters were intact and the baby lively. Under ether anæsthesia the abdomen was opened in the median line for about eight inches, the umbilicus being the middle of the incision. With the intention of removing the uterus altogether it was

brought out on the abdomen before it was opened. The placenta was located by a dark area on the anterior aspect of the fundus, which seemed much thinner than the other portions. As I wished to avoid this, I made the incision three inches below this and to the right of it in what appeared to be the thickest portion of the anterior wall, and struck the centre of the placenta exactly. As we had placed an elastic tube around the cervix previously there was no bleeding. The placenta was quickly pushed aside and the child delivered, which cried, by the way, before it was fairly out of the uterus. The sinuses were clamped and the hand passed down on the right to examine the tumor. From above this was found to be entirely independent of the uterine wall, and with some little effort it was lifted from the pelvic cavity. The true nature of the case was now revealed by the right tube and ovary being seen attached to the right side of this tumor. The pregnant left half of the uterus bore the left tube and ovary on its left side, but the bareness of the right side had not been noticed.

The right side was about the size of a four months' pregnancy, and it at least should have been removed and would have been but for the fact that the anæsthetist reported her color bad and her pulse rapid and irregular. We closed the wound in the pregnant half and then instead of removing it we made a two inch incision in the right side and scooped out the sympathetic decidua which was distending it. We opened it on the supposition that it too contained a fœtus. This wound was closed in the manner used in the large side, that is, first a row of interrupted and then continuous catgut lockstitch in the serosa. The wound was closed without drainage and she convalesced about as a normal labor patient would, until the tenth day, when she had pneumonia She recovered from this in a week and at the end of three weeks went to her home. Three weeks after this or six weeks after the operation I heard that it was feared she had phlebitis.

While this case is an interesting surgical curiosity, the reporting of it will be chiefly useful in the contemplation and consideration of the blunders committed. On account of the extreme rarity of the occurrence of such cases very few surgeons can be familiar with the signs of the condition and a failure to make out the true condition must be the rule. Even should one be idle enough to think it worth while to read anything about pregnancy in the bicornate uterus or to listen to a paper like this, the chances are he would try to forget it as soon as possible and put some information in the place of it that he would be more likely to have use for in the course of an ordinary lifetime.

The first blunder was in not suspecting that the tumor might be free from the uterine wall above where the hand could reach in the vagina. Had we suspected this the knee-chest position (which we considered and abandoned as useless) might have displaced the tumor and the operation been avoided. Even though the diagnosis of myoma had been correct the knee-chest posture should have been tried as it was possible to have been mistaken about the sessile nature of it. The next oversight was in not discovering the double cervical canal at the examinations made while the patient was in labor. They were easily discerned two weeks after delivery.

After making the diagnosis by opening the abdomen, we erred in supposing the enlarged right side contained a fœtus instead of only sympathetic decidua.

That we did not remove one or both sides of this uterus was unfortunate, but with a large fat patient who took the ether rather badly (in that her color was bad, respiration noisy and pulse rapid and alarmingly intermittent at times) it seemed best at the time to leave it.

In conclusion I regret very much that I did not have the pleasure of reading the following very clear resumé of all our case featured, in William's text-book, before we had occasion to operate. He says:

"When pregnancy occurs in one horn of a bicornate

uterus, the other undergoes sympathetic hypertrophy and a distinct decidua is formed in its cavity. Ordinarily there is no interference with the course of pregnancy, and spontaneous labor may be looked for. Much more rarely the non-pregnant horn may partially fill up the pelvic cavity and give rise to serious dystocia similar to that produced by tumors of other origin. Nagel mentions three cases in which labor could not proceed until this structure had been pushed out of the pelvic canal. In two other instances—one reported by Lolein and one observed in the out-patient department of the Johns Hopkins Hospital and reported by Bettman—the non-pregnant horn obstructed the pelvic cavity and gave rise to rupture of the uterus. In the latter case the condition was not recognized at the time of labor; the child presented by the breech and was extracted with difficulty. The woman died thirty-six hours later from a subperitoneal hæmatoma following an incomplete rupture of the uterus, which was clearly due to impaction of the non-pregnant horn in the pelvis. Worth has reported a case in which the horn became retroflexed.

"The diagnosis is usually not made, as in the majority of cases spontaneous labor occurs at term. Our own patient had given birth to eight children without any suspicion of the existence of the deformity having arisen. Sometimes the existence of a double vagina or double cervix puts one on the alert. The former may occur with a normal uterus, whereas the latter condition almost invariably indicates the existence of a double, or at least a bicornate, uterus. When there is only a single cervix, as in uterus bicornis unicollis, the condition always escapes observation, unless the patient is subjected to examination at an early period of pregnancy, and the depression between the two halves of the uterus gives a clew to the true state of affairs." (Williams.)

THE VICIOUS CIRCLE AFTER GASTRO-ENTEROSTOMY.

By John B. Deaver, M.D.,
Philadelphia.

Although systematic writers limit the term "vicious circle" to that condition after gastroenterostomy where the contents of the afferent loop of the anastomosis are passed into the stomach, and call the passage of the fluid from the efferent loop into the stomach "intestinal regurgitation," yet it has always seemed to me that such refinement in terms is superfluous, since in the immense majority of cases it is impossible to be sure which of the two conditions exists. It has therefore always been my custom to include under the classification of "circulus vitiosus" all those cases in which patients suffer from persistent vomiting after the operation of gastroenterostomy; and I am glad to see that this is the term adopted by Mr. Moynihan in this last work on *Abdominal Operations.*

Ever since the operation of gastroenterostomy was first done, without premeditation by Wolfler in 1881, surgeons have been seeking some method by which this vicious circle could be avoided. It is needless here to describe all the technical changes which the operation has undergone in attempting to eliminate this complication. Each individual method has been adopted to overcome what the surgeon believed was the cause of the vomiting. Those who thought it was due to spur formation at the site of the gastroenterostomy wound, aimed to prevent this by attaching the jejunum to the stomach for some distance both above and below the

opening; those who thought it was due to contraction of the anastomotic opening, took measures to ensure its patency; those who thought it produced by pyloric regurgitation, obliterated the pylorus; and those who considered that it depended on discharge of the contents of the afferent loop into the stomach, or to obstruction to discharge from the afferent loop, took measures to overcome this difficulty. But the fact remained that no one surgeon was able to assign a satisfactory cause for the condition, however great his experience may have been with the operation or with this much dreaded sequel. The theories of Chlumskij, of Steudel, and of Kelling, have all been disproved in some instances; and although we are forced to the rather humiliating conclusion that we do not know what the cause is, we are at any rate convinced that it is not in every case produced by the same factor, and we are sure of a few factors which are never alone efficient causes.

We have learned empirically that the posterior anastomosis with a jejunum (afferent) loop as short as it can conveniently be made, is the form of operation of all others which is least likely to be followed by pernicious vomiting of one form or another; and I think to Mr. Moynihan may justly be attributed the merit of drilling the fact into our minds. In saying this I am not unmindful that a similar operation, equally successful, has been and still is advocated by Murphy, Mayo, Hartmann, Robson and others; but it is peculiarly to Moynihan's credit that he has demonstrated the success and the simplicity of the procedure in a manner so far unexcelled.

It is not therefore, with the idea of bringing out anything particularly new in this department of surgery, that I venture now to discuss a subject which has already been so ably dealt with by other writers; but because I have thought by relating my own experience, which has been larger with this complication than I care to have it, and by narrating the history of some of my own patients, I might thus be enabled

to call to mind some points that might be of value to other surgeons who were attempting to solve the same problems.

Prevention. In common with all surgeons who did stomach surgery as long as ten years ago, my earliest gastroenterostomies were done on the anterior wall of the stomach by means of the Murphy button. It was not long, however, until I began doing the posterior operation, still employing the Murphy button. In the anterior operation a long afferent loop of jejunum is obligatory, on account of the necessity of spanning the transverse colon and great omentum; and, again, in company with other surgeons, I pursued the same technique in performing the posterior operation, not appreciating at that time the drawbacks and the very positive dangers of the long afferent loop. By this method, in both the anterior and posterior anastomoses, I occasionally had regurgitant vomiting develop after the operation. Believing that this was due to obstruction at the anastomotic opening, preventing the proximal (afferent) loop of jejunum from freely emptying itself into the distal (efferent) loop, I then changed my technique, so as to include at every primary operation an enteroanastomosis between the afferent and efferent loops, thus making sure that obstruction to the afferent loop at the gastric anastomosis could not exist. This method (which is practically that of Lanenstein, Braun, and Jaboulay) I have employed until within the last few months. It proved for a long time a satisfactory method, although its performance consumed slightly more time than the simple gastroenterostomy alone. To make this additional time as slight as possible, I at first employed a Murphy button in making the enteroanastomosis, although I had already abandoned this device in favor of the simple suture in the gastric anastomosis. As I say, for a long time this method proved satisfactory; but finally in one case I met with a disaster with the Murphy button—a disaster which was due to a fault of technique in selecting too large a button and which resulted in sloughing and perforation at one margin of the

enteroanastomosis. I therefore abandoned the Murphy button even for the intestinal anastomosis, and have since then employed simple suture for both this and the gastric wound. Even while still employing the method of posterior gastroenterostomy with the long loop and enteroanastomosis, I was of course well aware of the brilliant results of other surgeons from the operation with the short loop; but I was unwilling to abandon a technique with which I was familiar, and which was still proving itself satisfactory in my hands, for another which I had not personally tried, and which was therefore commended to me only on theoretical grounds. In the course of time, however, it came to pass that two patients on whom I had done this operation of gastroenterostomy returned to me with the vicious circle. I relieved them by secondary operations which I will presently discuss; but the mere occurrence of these two cases, small in proportion though they may be to the total number of operations I had done by this technique, proved that the technique was not faultless, and that it must be improved if I desired to avoid similar contingencies in the future. Then it was that I commenced my most recent series of operations, of posterior gastroenterostomy with the short loop; and I regret that its adoption is so recent that I can draw no final conclusions as to its comparative value in my hands. Moynihan (*Abdominal Operations*, p. 169) has not seen regurgitant vomiting nor the vicious circle in his last one hundred and thirty operations done by this method.

The merits of the posterior operation with the shortest possible loop are well recognized. That point on which so much depends, maintenance of previously existing anatomical conditions, is by this technique allowed its fullest application. The duodenojejunal junction normally is placed at about the same level as is the pylorus; and the jejunum descends obliquely and to the left from its origin, its upper surface lying in contact with the under surface of the transverse mesocolon. The greater curvature of the stomach thus

is found several inches below the beginning of the jejunum, and by anastomosing the jejunum about four or five inches from its origin with the posterior wall of the stomach just above the greater curvature, through the transverse mesocolon, neither the stomach nor the jejunum is disturbed from its normal relations with the other nor with the surrounding viscera. By this means also the duodenal contents, on their entrance into the jejunum, pursue their normal downward course, and by the force of gravity and peristalsis are carried past the opening in the stomach. When a long loop is employed the fluids in the afferent limb of the loop have to pass upward against gravity to reach the point of attachment of the jejunum to the stomach, and even if they succeed in reaching this point may then be discharged into the stomach instead of continuing their natural course along the jejunum.

Another valuable feature of the operation with the short afferent loop is that there is practically no space left between the root of the mesentery and the under surface of the transverse mesocolon through which a hernia of the small intestines may occur, passing from right to left or from left to right. Several cases are on record in which this form of internal hernia occurred, when the operation had been done with a long afferent loop, and a considerable portion of the mesentery acted as a band, stretching from the posterior abdominal wall to the site of the gastroenterostomy, and predisposing to volvulus and internal hernia.

A very important part of the operation of posterior gastroenterostomy, by whatever method performed, consists in stitching the edges of the incision through the transverse mesocolon to the gastric wall, a short distance away from the anastomotic sutures. This is a step which has been proved to be necessary by the occurrence of a hernia of the small intestines through the opening in the transverse mesocolon, into the lesser peritoneal cavity. Hartmann has had it occur; Moynihan has seen it; it occurred in the experience of Harte, of Philadelphia; and no doubt other instances are

on record. To obviate the occurrence of this complication most surgeons have adopted the precaution of stitching the edges of the opening in the mesocolon to the stomach. Mr. Moynihan, on the contrary, advises stitching it to the jejunal loop below the anastomosis. I cannot approve of this modification of the usual technique. Mr. Moynihan does not give any reason for this preference, and to my mind no good reason exists. By suturing the mesocolic edges to the stomach we in the first place close the opening into the lesser peritoneal cavity; this is the most important function of the procedure. But in addition to this we ensure the gastric opening being the lowest portion of the stomach, as the mesocolon draws the stomach down into a funnel-shaped depression; and we moreover avoid any possible constriction of either loop of the jejunum. That this last is an important feature of the operation I think cannot be denied. Probably every surgeon has seen cases where the opening in the transverse mesocolon, not having been sutured to the stomach, contracted, and becoming quite tough and cicatricial, presented a very material obstruction to the emptying of the proximal loop of the jejunum into the distal loop. And although I know this cannot be blamed for all cases of vicious circle, it is certainly my conviction that obstruction of the afferent loop is the most usual cause of pernicious vomiting.

Having thus sketched the progress made toward the most modern, and, as I believe, the operation which is technically most correct, I desire next to discuss the various plans which I have pursued in the treatment of the vicious circle.

Treatment. No surgeon is pleased to be called upon to open an abdomen to correct some fault of technique, or some theoretically avoidable error in an operation, which only becomes apparent some days, weeks, possibly months or years, after the primary laparotomy.

If a patient recovers satisfactorily after the first operation, and remains well for a year or more, and then begins to

have recurrence of the old symptoms of pyloric stenosis, such is not truly suffering from the vicious circle. He or she is probably suffering from a recrudescence or a recurrence of the disease; and an operation a little more radical in its scope will probably effect a permanent cure. Such patients have often been operated on by gastroenterostomy for mild degrees of pyloric obstruction. Immediately after the operation the new gastrointestinal opening performs its function well, the ulcerated pyloric region is resting, and eventually heals. When this stage is reached it becomes easier for the stomach to empty itself by way of the pylorus, in the natural manner, than into the artificial gastrointestinal anastomosis. As a consequence of this return to former conditions the gastroenterostomy contracts as the result of disuse, and the imperfectly healed pyloric region again becomes ulcerated, and the old symptoms return. The whole series of events may be accomplished within a few weeks—eight weeks to two months—or immunity from discomfort may last a year or more. In rare instances such an operation effects a permanent cure. But the lesson which the surgeon must draw from such cases is to completely occlude the plyorus at the primary operation and thus procure that region of the stomach constant rest, and ensure the permanent patency of the gastroenterostomy wound.

There is, however, another class of patients, in whom no period of absolute freedom from vomiting has been present after the primary operation, but who nevertheless do not lose weight and become emaciated. I have observed two or three such patients. After the gastroenterostomy convalescence was satisfactory, but occasionally there would be copious vomiting of bilious matter. Meals were eaten with appetite, no discomfort ensued, but three or four hours after the meal, this copious bilious vomiting would occur. The patients did not lose in weight. One patient gained forty pounds during the first year after the gastroenterostomy, but the vomiting of pancreatic and bilious fluids was so

annoying and persistent that she finally submitted to another operation. The fact that these patients vomit practically no food, that digestion is accomplished without special discomfort before the vomiting occurs, and that they do not lose in weight, are all important matters to be considered. We are assured from these facts that digestion and assimilation are accomplished fairly well; but that the excess of bile and pancreatic juices in the stomach finally causes nausea and vomiting. We know from every-day experience, as well as from experiments upon dogs, and from the operations of Terrier and others, that a moderate amount of bile or pancreatic juice in the stomach is productive of no particular discomfort, and interferes in no way with the digestion or with the health of the individual. And we know, on the other hand, from the experience of Kelling, that the duodenum becomes filled through the pylorus until its capacity is reached, and that then the movements of the stomach cease as the result of reflex nervous action, until the duodenum has discharged its contents into the jejunum. It is by this important mechanism that digestion is accomplished, and that the bile and the pancreatic juice are enabled to act upon the chyme from time to time as it is propelled through the pylorus, and that they are not called upon to digest at any one time a disproportionately great quantity of food. Not until the duodenum is emptied, therefore, can any further chyme be discharged from the stomach. Now, Kelling found that obstructions at the duodenojejunal flexure by preventing emptying of the duodenum caused arrest of gastric peristalsis until such time as absorption from the obstructed duodenum rendered it empty, and thus removed the inhibition of the stomach's peristalsis.

In searching for an explanation of the mechanism present in the class of patients just described, I do not think we need to look farther. The form of operation primarily employed was posterior gastroenterostomy with a long loop. It was probably the length of the loop that preserved the patient's

life. There was formed an obstruction to the intestinal canal at the site of the gastroenterostomy. The duodenum and afferent loop became filled with food and bile and pancreatic juice. Some food no doubt passed into the efferent loop; but the important point for us just now is that the proximal (afferent) loop, together with the duodenum, became filled, either by antiperistalsis through the gastroenterostomy wound, or through the pylorus. When this proximal loop became filled, stomach action ceased; hence there was no vomiting soon after eating; and as the proximal loop was long, it held a fair quantity of food; this food was digested in and absorbed from the proximal loop; though no doubt some food was received from the stomach into the distal loop and was digested in and absorbed from it.

The longer the proximal loop, the more would it hold, and the better would digestion be accomplished. When the proximal loop was finally emptied by absorption, stomach movements returned, and the surplus of bilious and pancreatic matters which had entered it from the duodenum, as well as the residue of food, if any remained, were rejected by vomiting. Now to relieve such a condition, the primary object must be to prevent overfilling of the proximal loop with food. The mere presence of bile in the stomach would not produce the vicious circle—it would be more or less perfectly neutralized by the acid juices of the stomach and would be promptly discharged again from the stomach into the distal loop if that was the easiest course for it to pursue. Therefore, it is my opinion that, in occluding the pylorus to remedy the vicious circle, we do it not so much to keep bile out of the stomach, as to keep stomach contents out of the duodenum and the proximal loop. If we make it easier for the stomach contents to escape directly into the distal loop of the gastrointestinal anastomosis, than it is for them to go anywhere else, we will not have the vicious circle occur. Likewise when we obliterate the proximal loop between the stomach and the enteroanastomosis, we are not so much seeking

to prevent the discharge of its contents into the stomach, as we are to keep the stomach contents out of it. It is the rarest thing in the world not to find the proximal loop distended and the distal loop collapsed at an operation undertaken to relieve the chain of symptoms known as the vicious circle.

In the class of cases I am discussing now, it is more than probable that the proximal loop becomes filled more by way of the pylorus, through the normal peristaltic action, than it does directly from the stomach by antiperistaltic action through the gastroenterostomy. If, therefore, we occlude the pylorus, we shall in all probability make it easier for the stomach to empty itself through the gastroenterostomy by normal peristalsis into the distal loop than it will be for it to empty itself by antiperistalsis into the proximal loop. The bile and pancreatic juice discharged from the proximal loop into the stomach, will readily find their way out again by peristalsis into the distal loop; and, as remarked before, this factor is much less to be feared than is the reverse action—discharge of the stomach contents into the proximal loop by antiperistalsis. But if the occlusion of the pylorus is not in itself sufficient to overcome the vicious circle, then the proximal loop must be obliterated close to the stomach, and exit for its contents into the distal loop provided for by means of an enteroanastomosis. I recommend occluding the proximal loop close to the stomach because I am so thoroughly convinced that the mischief is caused not by the discharge of the contents of the proximal loop into the stomach, but by the antiperistaltic discharge of the contents into the proximal loop.

We sometimes meet with instances of the vicious circle which more imperatively demand relief than those patients just mentioned. In other cases the vomiting is persistent from the time of the operation, emaciation is rapid, and unless something is speedily done to relieve the patients, they will die of exhaustion and inanition. It is no doubt true, as has

been remarked by Richardson, that there are certain patients whom no manner of surgery will cure, who are doomed from the first to die under any circumstances. This is rather a pessimistic view to take, and as the surgeon can never be certain that his patient belongs to this doomed class until he is actually dead, I think he should act in accordance with the motto "While there is life there is hope." For my own part, I do not feel comfortable to let my patient go steadily down hill without interfering to relieve him as far as I can; and reoperation is, I think, not to be postponed too long in such cases. Of course gastric lavage should first be tried and all the other medical measures usually employed in cases of postoperative vomiting. But operation should not be postponed so long that the patient's strength will not be sufficient to withstand the shock; and, on the other hand, too extensive an operation should not be employed on such debilitated patients. To reopen the wound, pass a silk suture around the pylorus, tie it, and again close the wound, consumes very little time; and if relief is not thus obtained a third operation can be done, at which the proximal loop can he tied off between the enteroanastomosis and the stomach. I should myself very much prefer to reoperate twice and have the patient ultimately recover, than to prolong the first operation until no chance of recuperation remained.

The exact procedure to be adopted at the secondary operation will of course depend upon the technique employed at the primary operation. If no enteroanastomosis was done at the first operation, this will probably be the proper thing to do first on reopening the belly. If this has been done, then I think ligation of the pylorus should be our second choice, and ligation of the proximal loop should be reserved to the last.

I have seen certain patients who suffered discomfort after gastroenterostomy, and who occasionally had regurgitant vomiting, who were completely relieved of their symptoms by wearing a light abdominal belt. On removal of this

support the symptoms recurred. These factors I have explained on the supposition that the long proximal loop dragged on the gastric anastomosis and became, so to speak, waterlogged; and this condition was overcome by supporting the proptosed loop by means of the abdominal binder.

As I have already said no one factor is always operative in producing the symptoms of the vicious circle; and no one method of treatment will suffice to effect a cure. Prevention is the best treatment, and that this is accomplished as nearly as can be by posterior gastroenterostomy with the short loop, I think has been demonstrated. But when the vicious circle does arise, it requires energetic treatment, and happy is that surgeon whose treatment meets with success.

My experience embraces five cases of vicious circle in which there was left a long loop of jejunum; all of these were operated for the correction of this condition. In three cases an enteroenterostomy relieved the condition entirely. In one an enteroenterostomy with tying off of the pylorus corrected the condition. In the fifth case it was necessary for me to do four operations; the first consisted of relieving adhesions at the site of the gastroenterostomy anastomosis, which was followed by temporary relief; a second operation consisted of an enteroanastomosis; a third the relief of adhesions, and a fourth tying off of the pylorus; this patient recovered.

PENETRATING WOUNDS OF THE ABDOMEN, WITH REPORT OF CASES.

INCLUDING A CASE OF TRAUMATIC RUPTURE OF CONGENITAL CYSTIC KIDNEY.

By C. E. Caldwell, M.D.,
Cincinnati, Ohio.

In presenting this report of nine cases of penetrating wounds of the abdomen for your consideration, I am actuated by a desire to contribute the results of my work along this line to the general stock of available information on a question upon the correct answering of which many valuable lives may depend and a great many more perhaps not so valuable, except from an individual and biased point of view. There seems to be a consensus of opinion on one point, and that is if the life of the victim of gunshot or stab wounds of the belly is of much consequence he will succumb, if not he stands a good chance of getting well.

This very unscientific theory, if such it be, has a foundation in truth to this extent: the more highly organized and intelligent the individual the more likely is he to add to his condition of physical shock the profound mental depression which comes from a fuller realization of all the remote possibilities of his misfortune.

As to the propriety of immediate operation in all cases of suspected penetrating wounds of the abdomen there will be heard hardly a dissenting voice from the surgeon of advanced views.

In all suspected cases of penetrating wounds the patient should be immediately prepared for operation, the gravity and extent of which will be determined by free exposure of the wound of entrance by incision.

To the objections recently advanced by those who have witnessed the comparatively favorable results of non-interference in penetrating wounds inflicted by steel-jacketed bullets of small calibre during the Spanish American and Boer wars, I can do no better than quote the opinion of Capt. Charles Edwin Belin Flagg, in the *Journal of the Association of Military Surgeons.* He says: "In civil surgery a case of supposed penetrating gunshot wound of the abdomen demands immediate exploration. If there is doubt as to penetration the wound is laid open, and if it is found that penetration has taken place, further exploration is imperative."

The same rule applies to military surgery. No larger percentage of these cases occurring in war will recover if left untreated than of those occurring in peace.

In civil surgery we do not wait to find out whether the man was shot by a steel-jacketed small calibre bullet that may have made a small aseptic hole in the intestine, or may not have wounded the intestine. By what process of reasoning then is this urged on military surgeons?"

But leaving out of the question the subject of military surgery, where the conditions under which a patient is received and treated, differ so materially from those of civil life, the question is, are there any real objections to be urged against immediate operations in cases of suspected penetrating wounds of the abdomen?

It has been argued by the ultra-conservative, that even in cases where the bullet or knife blade has penetrated the abdominal cavity, we are by no means certain that any viscus has been wounded, and were it not better to wait until some symptoms pointing to such perforation arise before operating? The only answer to this question is, that if we wait until we can be reasonably sure of visceral lesions we would better decline

to operate at all. I do not mean by this that we are to refuse to operate on cases that have developed definite symptoms of perforation at the time when we first see them, but that if we have advocated a dilatory policy we would better be consistent and refuse to operate at all.

On what ground do the conservative people urge delay? On the ground that exploration only adds an additional risk in case there is no perforation. But even though there be no perforation is not the assurance that a thorough exploration gives worth anything? And does it really add much to the chances of mortality?

How are we to know when to operate and when not? It has been often enough demonstrated that multiple perforations may exist without any appreciable signs of shock, hemorrhage, or any other evidence of serious mischief.

A case in point is one reported by Dr. Ellsworth Elliot, Jr., to the New York Surgical Society. This patient who had been shot in the abdomen with a pistol, showed so little evidence of shock that it was believed that the bullet had traversed the circumference of the abdominal wall without penetrating. An incision in the track of the bullet disclosed penetration. Opening of the peritoneal cavity disclosed ten perforations of the ileum. These were sutured and the patient made a good recovery.

Dr. John Young Brown, who reports nine cases of perforating gunshot and stab wounds of the abdomen with six recoveries and five penetrating stab and pistol-shot wounds with wounds of the liver with four recoveries, says: "When a knife or bullet has penetrated the peritoneal cavity there is but one method of determining perforation, and that is by means of an abdominal section and a careful investigation of the abdominal viscera."

If, then, serious visceral lesions may exist without causing pathognomonic symptoms, what course is left to us but to assume in every case such lesions until their absence is demonstrated by exploration? Even with most careful search

one lesion among many may be overlooked, as in Case V. of my series, in which the autopsy developed a hole in the posterior wall of the stomach opening into the lesser peritoneal cavity which under the circumstances detailed in the history of the case rather naturally escaped detection.

The only argument then that can be advanced against immediate operation in these cases is that the necessity for operation may not be present. Douglas, however, estimates the number of penetrating wounds associated with visceral lesions at 97 per cent., and while willing to grant that this is a rather high percentage, yet it must be admitted that the chances are greatly in favor of intestinal perforation or other visceral lesions. In my own series of cases there were only four which might not have recovered without operation, but it will be noted that there was no mortality except in the two cases that were doomed either with or without operation.

As to the technique of these operations I think every operator will be guided by his own judgment in selecting that method which seems most appropriate in any given case. The questions of flushing the abdomen or dry sponging, drainage, or closure, one form of suture or another must have and always will have their respective adherents and it is not the purpose nor ambition of the writer to discuss them here.

In conclusion, I take pleasure in acknowledging my thanks to Drs. N. P. Dandridge, J. C. Oliver, and E. W. Walker, through whose courtesy in permitting me to take charge of their respective services at the Cincinnati Hospital I am indebted for the opportunity to operate on these cases.

Case I.—W. H., aged eight years, seen in consultation with Dr. Edmund Shields. Condition on first visit: child resting quietly in bed, suffering some discomfort in the abdomen. Examination revealed a small bullet wound made by a Flobart rifle ball. While impressed with the conviction that the ball had penetrated the abdomen, yet the boy's condition was so devoid of any appearance of

shock and the calibre of the bullet was so small that he was treated expectantly. At the end of an uneventful week there was a sharp hemorrhage from the bowels, but the boy's condition remaining otherwise favorable he was allowed to go on under expectant treatment. His recovery was prompt and uneventful.

Case II.—J. C., aged sixty-seven years, white, male, occupation farmer. Seen in consultation with Dr. J. C. Cadwallader, July, 1901. Condition at first visit: patient was somewhat nervous, having been told that I had come to operate on him. He had shot himself with a 38-calibre revolver, with suicidal intent. The wound of entrance was midway between the xiphoid appendix of the sternum and eighth costal cartilage on left side. The patient had vomited blood, his temperature was 101° F.; he was somewhat restless and complained of some pain. Believing there was perforation of the stomach an incision was made four inches in length over the stomach. A large clot of blood was found on the anterior wall of the stomach, under which I expected to find a perforation. Careful examination of the stomach and colon failed to reveal a perforation. The ball having lodged in the muscles of the back in a direct line with the incision and there being no evidence of perforation of viscera in the track of the bullet, the abdominal wall was closed after careful sponging of the stomach wall, and the bullet extracted from the back, where it could be felt lying quite superficially. The patient recovered promptly. In three weeks he was about his farm duties and seemed to have been cured of any further desire to take his own life.

Case III.—J. K., aged fifty-three years, male, German, occupation policeman. Entered Cincinnati Hospital in the service of Dr. E. W. Walker, September 17, 1904, with a gunshot wound of the abdomen received in the discharge of his duty. Condition on admission: well-preserved and well-developed. Layers of subcutaneous fat excessive. General condition good. Pulse strong and full, rate about 100

per minute. Respiration slow and deep. Patient rational and conscious. No vomiting. No cough or expectoration. Heart and lungs normal. Abdomen excessively fat. On left side just below the costal border and about two inches outside of nipple line is a bullet hole about three-eighths of an inch in diameter, with an area of bluish-red discoloration about it. No exit bullet hole found. Belly is not tender. Patient complains of some pain in right groin.

Bladder catheterized. Urine clear and straw-colored. Patient sterilized and sent to amphitheatre, and at 5.45 P.M., an hour after entrance, I operated.

An incision was made in the track of the bullet and careful dissection was made down to the peritoneum, through which the bullet was found to have penetrated. The incision was enlarged in the direction of the fibres of the external oblique. The peritoneal cavity was exposed by use of retractors. Careful examination was made of the adjacent coils of intestine. The direction of the ball being downward toward the pelvis, and no evidence of free gas in the peritoneal cavity having been detected, I contented myself with an inspection of such loops of the intestine as could be delivered through the abdominal incision. No hemorrhage of any consequence was noted. The peritoneal and muscular layers were closed with catgut and the skin with silkworm gut, a small drain of gauze being left in the bullet wound. Patient made a good recovery, was fully convalescent on the eighth day. A slight wound infection delayed his discharge until the fifth week, when he left the hospital fully recovered.

CASE IV.—W. B., aged twenty-one years, male, colored, occupation student. Shot in the abdomen with a 38-calibre in the hands of a friend while scuffling for its possession. Admitted to the hospital in the service of Dr. N. P. Dandridge on the evening of July 19, 1905. Condition on admission: well-developed and nourished young adult. Heart and lungs negative. Temperature, 97.6; pulse, 80; respiration, 24. Breathing thoracic. Abdominal tension slightly

increased. On abdominal wall on the level with and one inch to right of umbilicus is a ragged wound, edges blackened. Wound bleeds slightly. House surgeon after cleansing the wound inserted probe but it did not penetrate the abdominal cavity. The probe entered downward, inward to median line, about three and one-half inches. Failed to show penetration.

The patient was catheterized. Urine dark clear amber. Acid. Specific gravity 1020. No albumin, no sugar, no casts. Two enemas were given, the last was effectual. The patient was prepared for operation and I was sent for. At the time of operation patient was in good condition, no evidence of shock other than subnormal temperature. Patient was frightened. The abdominal wall was rigid, liver dulness normal. Under anæsthetic the rigidity somewhat disappeared. Abdomen slightly distended.

An incision was made over the wound of entrance and carried to the middle line in the course of the bullet. Penetrating wound was found plugged with omental fat. The incision was enlarged to six inches in length. The intestines were eviscerated in hot towels. Four large perforations about three-eighths of an inch in diameter were found. The edges of the wounds were ragged, with everted mucosa. But little extravasated fecal matter was seen. The bowel was full of clotted blood. These were closed with fine silk purse-string sutures, first through the mucosa and again through the peritoneal coat, including the muscularis. The entire bowel was then carefully examined for other perforations, but without finding any. The peritoneal cavity was flushed with warm 6 per cent. na. chl. Dry sponging of the cavity was then practised. The peritoneum was closed with continuous catgut sutures as was also the muscular aponeurosis, and the skin suture was done with silkworm gut. The patient made an uneventful recovery and left the hospital well at the end of the sixth week.

Case V.—E. N., aged thirty-five years, male, colored,

occupation laborer. Entered the Cincinnati Hospital, in the service of Dr. J. C. Oliver, with gunshot wound of the abdomen incurred during a friendly game of crap. Condition on admission: Well-developed negro. Temperature, 98° F.; pulse, 104; respiration, 36; shock moderate. Considerable pain in the abdomen. No external hemorrhage. Bullet wound of entrance in left anterior axillary line over tenth rib. Exploration of the course of the bullet after thoroughly cleansing the skin showed a downward direction and toward the median line. Penetration of abdominal cavity evident.

Patient prepared for immediate operation. Operation under nitrous oxide ether anæsthesia. Exploration before operation in the line of bullet revealed wound of penetration. Abdomen opened in median line. Incision carried from just below xiphoid appendix below umbilicus.

On opening the peritoneum, dark clotted blood poured out in a great quantity. Rapid sponging of the abdominal cavity was followed by turning the intestines out en masse into hot towels. Search was at once made for the source of the bleeding, which was found to come from large superior mesenteric branch included in leaflets of the root of the mesentery. Having apparently stopped the source of hemorrhage by transfixation of the mesentery, including the bleeding vessel, attention was turned to the bowels. Six wounds of entrance and exit were discovered, which were quickly closed by purse-string sutures of fine black silk, the peritoneal coat being reinforced by one or two interrupted sutures. There being evidence of more deep-seated bleeding the mesentery was carefully examined and three perforations through its folds were found and sutured, thereby stopping the hemorrhage again. The bowels were then re-examined throughout for further perforations. None being found it became once more necessary to search the abdominal cavity for sources of continued bleeding. It being impossible to stop the bleeding by ligature, and the patient's condition having become very threatening, a hæmostat was left clamped

at the root of the mesentery, the intestines after light sponging were returned into the abdomen and gauze drainage down to the site of bleeding was introduced. The abdomen was closed in three tiers of sutures and the patient returned to the ward.

The patient did not do well, and on the third day, there having been fresh hemorrhage, he was taken to the amphitheatre, the abdomen again opened and found full of fresh blood. No time could be lost in vain attempts to ligate the bleeding vessels, and fresh clamps having been applied, after clots had been removed and abdomen sponged out, the abdomen was again closed and the patient removed to the ward, where he died nine hours later.

Case VI.—E. B., aged thirty-nine years, male, colored, occupation laborer. Entered Cincinnati Hospital in the service of Dr. J. C. Oliver, September 16, 1905, for multiple gunshot wounds. Condition on entrance: well-developed and nourished adult negro, fully conscious and rational. On posterior surface of right shoulder one gunshot wound about one-fourth of an inch in diameter. On right side of chest about the level of third rib midway between mammary and anterior axillary line another bullet wound. On right side of sternum about one-half inch from the edge of the sternum at the level of the fifth rib. On right side in mammary line at the level of the ninth costal cartilage is still a fourth bullet wound; probe passes downward and inward two inches.

As we are concerned only with the two lower wounds I will limit the report to these.

An incision was made over the wound penetrating at the fifth cartilage. There was found to be free hemorrhage coming from a penetrating chest wound. The hemorrhage was probably from a branch of the internal mammary. The entrance wound having been enlarged and it having been found impracticable to ligate the bleeding vessel a hæmostat was left clamped in situ. The fourth having entered in the neighborhood of the liver it was deemed advisable to

explore it. A free incision was made downward and inward following the track of the ball. The interlacing aponeurotic fibres of the external oblique and rectus muscles formed a firm basket-work frame in which there was no evidence of a bullet having entered. Confident, however, that the ball must have entered at this place I divided the aponeurosis freely, opening up the muscular parietes down to the peritoneum. The ball was found lying on the peritoneum but had not penetrated, illustrating the value of following up the track of the ball. The linear wound was closed with a small cigarette drain in the path of the bullet. There was some suppuration from the wound to the right of the sternum and some shreds of cloth were expelled. The patient recovered promptly and left the hospital well on the twenty-third day.

Case VII.—G. A., aged thirty-four years, male, Italian, occupation laborer. Entered the service of Dr. N. P. Dandridge, September 11, 1904. Condition on entrance: Great shock, shallow sighing respiration. Temperature subnormal. Stab wound in right side of abdomen inflicted with stiletto. Operation immediate.

Believing that the hemorrhage came from the iliac vessels, the incision was made at the site of the wound. On opening the belly an enormous retroperitoneal hæmatoma was discovered. The peritoneum was quickly opened, turning out great masses of partially coagulated blood. Most of the bleeding was from the common iliac vein, which was promptly ligated. There was also a small wound in the wall of the right common iliac artery, which was closed by suture. Four perforations were found in the small bowel, but there was only time to close two of them. The patient died on the table from hemorrhage. Autopsy revealed a wound in the ascending vena cava as well.

Case VIII.—E. R., aged nineteen years, white, male, occupation teamster. Entered Cincinnati Hospital, in the service of Dr. J. C. Oliver, August 1, 1905, with penetrating

stab wounds of the abdomen. Condition on admission: well-developed and nourished young male adult, suffering slight shock, and very restless.

On examination discovered a clear-cut incised wound about three inches long, transverse to long axis of body and situated just below the xiphoid cartilage extending clear across the interval of substernal angle. The recti muscles were cut and their cut edges protruded through the wound. Hemorrhage is free. The cut extends down to and through the peritoneum. The gastrocolic omentum bulges into the wound. The examining finger readily enters the peritoneal cavity.

On the left side about one inch above the crest of the ilium, in the anterior axillary line, is another cut which bleeds freely and into which a probe can be entered fully three inches and moved about freely.

The patient was prepared for operation, which I did within an hour of his entering the house. The incision was made in the median line, connecting with transverse incision, and carried down to the umbilicus.

The liver and stomach were untouched. The costal cartilage of the seventh rib was cut nearly in two and there was bleeding from an intercostal artery; this was secured and tied. The hand was then passed into the abdominal cavity to the inner wall on the left side and the intestinal loops lying in the neighborhood were first drawn out and inspected. No injury to the bowel was found. A careful examination with the finger of the parietal peritoneum aided by a probe introduced from the wound and by reflected light failed to discover any rent in the peritoneum. To make assurance doubly sure the intestines were carefully passed through the gloved fingers from end to end, but no perforations were found. Free blood in the pelvis was carefully sponged out with gauze on a stick, the intestines returned, and the abdominal wound closed except where a small drain of gauze was laid over the liver on the original transverse

Ruptured kidney removed at autopsy.

incision. The other wound was drained by a small iodoform gauze wick. The patient made a prompt recovery and was discharged well on the eighteenth day.

Case IX.—J. B., aged forty-five years, white, male, occupation laborer. Entered Cincinnati Hospital, in the service of Dr. J. C. Oliver, with penetrating stab wound of the abdomen and stab of arm near shoulder. Condition on admission: presents at anterior border of quadratus muscle, midway between costal border and crest of the ilium, a stab wound one-half inch in length passing directly inward and entering the abdomen. Patient suffers no shock. Pulse, respiration, and temperature normal.

Operation undertaken promptly. Belly opened in median line, bowels drawn out and carefully examined. No perforation was found, but the mesentery was blood-stained throughout. No bleeding vessels noted. Hemorrhage probably from the wound in the abdomen. The abdomen was mopped dry and closed. A small gauze wick was left in the stab wound. The patient made a prompt recovery and was discharged well on the twenty-third day.

I append this report of a case of traumatic rupture of the kidney as I think it is rather unique in that the ruptured kidney was one of two congenital cystic kidneys the photograph of which I have with me.

Case X.—A. P., aged forty-eight years, Italian, occupation laborer. Entered the Cincinnati Hospital July 26, 1905, in the service of Dr. Dandridge. For some reason he was admitted to F ward, a ward devoted to criminals and drunkards. He was attended by the house surgeon until the third day, when he was transferred to the regular male surgical ward and I was asked to see him.

History. On the afternoon of July 26th, while working on a railroad, a tie thrown from a flat-car bounced and struck him in the right loin. On admission, the history reads, he was suffering greatly, face drawn, abdomen distended, much pain in lumbar region. Increased dulness

in lumbar region, but no tumor formation. Bowels confined. Urine drawn was very red, 1010, alkaline, albumin, but no casts, numerous blood cells. He was removed to F surgical ward on the 29th, and I saw him on my regular morning round July 30th. A distinct tumor was discernible in the right loin, which I diagnosed as a retroperitoneal hæmatoma due to ruptured kidney. The patient was immediately prepared for operation. The kidney, exposed through loin incision was found in a half-gallon of blood clots and urine. No pulsation could be felt of the renal artery, although the ureter was untorn. A large cystic kidney weighing 900 grams was found broken in two pieces, having been torn down into the hilum. Hemorrhage was controlled by a hæmostat introduced deep into the wound to the proximal end of the torn artery. The patient died ten hours later. I ordered an autopsy, predicting that the other kidney would be found similarly enlarged and cystic.

END RESULTS IN APPENDICITIS WORK.

By Edward A. Balloch, M.D.,
Washington, D. C.

There exists at the present time among surgeons a difference of opinion as to the propriety of removing the appendix when the abdomen is opened for other purposes. My own practice has been to remove this dangerous rudimentary organ if the additional time necessary to do so would not jeopardize the chances of the patient for making a good recovery. So far I have seen no reason to regret this course. Indeed, I have had many patients express to me their thanks for having relieved them of this dangerous incubus.

Opinion on this matter being divided, one must try to sustain his position, and in thinking over the matter I concluded to try to find out, from the patients themselves, the ultimate results of the removal of the appendix, so far as they could be ascertained. Manifestly it would not be fair to base any opinion upon those cases in which the appendix was removed supplementary to other abdominal work. There would be so much difficulty in ascertaining how much of the result was due to the appendectomy and how much to other operative work, that no satisfactory conclusions could be drawn. Again, it would not do to take account of cases of acute appendicitis, as there could be no room for argument as to the propriety of operation in these cases. In the third place the difficulty in tracing ordinary hospital cases and the presumed unsatisfactory nature of any replies that they might make led me to exclude them also. There remained, then, only the cases in which the appendix was removed for

chronic or quiescent disease, and accordingly I selected from my records twenty-five cases of this character in which the appendix had been removed. These were all private cases and in each instance the patient was an intelligent person, fully capable of estimating the results, good or bad, following operation. Many of these were interval cases, without any particular evidences of disease at the time of operation. The following questions were asked:

1. What is the condition of your general health now as compared with what it was before operation?

2. With respect to pain in the abdomen, digestive disturbances, bowel movements, etc., is your condition better or worse than it was before operation?

3. Has your body weight increased or diminished?

4. Are there any other results, good or bad, which you consider to be due to the operation?

Twenty-two replies were received. In answer to the first question, 18 or 82 per cent. answered that their general health had been improved; 4, or 18 per cent., could note no change. None was worse.

With reference to abdominal symptoms, 16, or 73 per cent., noted improvement; 5, or 23 per cent., could notice no change, while one reported that she was worse, but gave no details.

As to bodily weight, 13, or 59 per cent., reported a gain. In one case there was a gain of over twenty-five pounds within a year. Seven, 32 per cent., noted no change, while 2, or 9 per cent. reported that they had lost weight, but attributed the loss to other causes, such as subsequent illness, etc. In the replies to the last question as to any other results, good or bad, from the operation, many interesting things were noted. None could notice any bad results attributable to the operation. One woman stated that her menstruation had been much better since operation; another, that she was subject to frequent headaches before operation, but has had none since, and yet another that the feeling of relief and freedom from danger has been a great pleasure to her.

From the results of this inquiry, it will be seen that the removal of the appendix in these cases not only did no harm, but that in nearly every instance it did good. It might be objected that there is no analogy between the removal of an appendix the subject of chronic inflammation, or one which is quiescent, and the removal of an appendix in the course of an operation for other conditions. In answer to such an objection, I beg to submit the following argument: In the first place it is seldom that the appendix remains unaffected when neighboring organs and structures are diseased. Any peritoneal irritation in its vicinity is liable to involve the appendix. Again, many gynecological conditions are accompanied by constipation and any pathological condition involving the cæcum will probably affect the appendix as well. Viewed in the light of these considerations, the analogy between the two classes of cases does not seem so forced as it might at first sight. Secondly, it is difficult to tell from the appearance and feel of an appendix whether or not it is diseased. An appendix which looks and feels normal may show the changes incident to chronic appendicitis, while, conversely, an appendix which looks to be diseased may be microscopically normal. If we confine ourselves to the removal of apparently diseased appendices we shall leave many which are diseased and remove some which are normal. This being so, why not remove them all and so give the patient the benefit of the doubt?

In the third place, the argument that the appendix is possibly an organ useful and necessary to the human economy does not appeal to me. If the teachings of comparative anatomy are of any value at all we must agree that the appendix in man is, as Huntington states, "A part of the general cæcal pouch which persists in an early developmental state and which we can regard as destined for further reduction and ultimate elimination in the course of evolution." If it is a part of the general cæcal pouch and identical in structure with it, we can certainly assume that it is relatively

so insignificant a part of the bowel that its removal can in nowise affect the rest of the intestinal tract, and if it is destined to evolutionary extinction, I can see no harm in anticipating the slow processes of nature by the quicker processes of the surgeon. It is for those who assert the importance of the appendix to the human economy to prove their assertions, as the burden of proof is certainly on their shoulders.

An extensive reading of the literature on this side of the question has not shown me anything so far but a series of "maybes" and "perhapses" which are pure speculation. All the solid arguments are in favor of the uselessness of the organ and we may feel justified in so regarding it until something more convincing appears than has appeared up to this time.

The question is often asked as to whether one has any knowledge of cases where harm has been done by not removing the appendix when the abdomen is opened for other purposes. Personally, I have not met with any case where having left the appendix in the course of other abdominal work, I have had to remove it afterward, but my colleague, Dr. Thomas J. Kelley, of Washington, has given me permission to use the following two instances in his practice, where the leaving of the appendix worked harm, and where death resulted which might have been avoided by the removal of the appendix at the first operation.

Case I.—Mrs. K., married, two children. Was operated on at the Columbia Hospital, in 1893, by Dr. Stone, for a large pelvic abscess. In October, 1904, she was taken with violent pain in the abdomen while in the country. Was seen by Dr. Kelley three days after the onset of her illness and, by his direction, was removed to the Georgetown Hospital. She refused operation at first, but finally consented, after a week's delay. She was then operated on as a last resort and died three days later of peritonitis.

Case II.—Miss B., aged twenty-six years and single. Was operated on, in 1897, by Dr. Kelley, for retroversion

of the uterus, a ventral suspension being done. In January, 1903, Dr. Kelley was called to the country to see her, her attending physician having diagnosed appendicitis. Dr. Kelley saw her three days after the beginning of the attack, and confirmed the diagnosis, but found her so very ill that he declined to operate. She died thirty-six hours afterward.

Here are two lives which might have been saved by a few minutes' additional work when the abdomen was opened the first time. On the other hand I have never seen or heard of a case where an appendectomy as a supplement to other abdominal work resulted in any harm to the patient, so that, from a purely operative standpoint, the weight of the argument is in favor of those who advocate this course.

The following conclusions may summarize this communication:

1. The appendix is a rudimentary organ; a part of the cæcum; undergoing obliteration, and so far has not been shown to be in any way a necessary part of the human economy.

2. Reasoning from the results of operation in cases of chronic and quiescent appendicitis, the removal of the appendix in the course of operations for other conditions is justifiable.

3. The difficulty of determining from macroscopic examination whether an appendix is diseased or not is an argument in favor of the removal of the organ.

4. The fact that deaths have occurred that might have been avoided had the appendix been removed at the first operation, is an unanswerable argument in favor of the practice advocated in this communication, viz., that the appendix should be removed as a routine measure in abdominal work, provided always that its removal will not prejudice the chances of the patient for a smooth recovery.

It takes but a few additional minutes to remove the appendix, and when its removal may mean to the patient the difference between comfort and discomfort, or, indeed, between life and death, is there any impropriety in advocating the removal of this dangerous ancestral relic?

SOME OF THE USES OF PELVIC MASSAGE.

By Joseph Taber Johnson, M.D.,
Washington, D. C.

There have always been fads and fanatics in the practice of medicine and I presume there always will be. Men and sects have arisen since time immemorial who pretended to cure all manner of diseases.

In most of the pretentions put forward one idea has predominated, until some other idea, made more plausible to the general public has displaced previous pretentions by more emphatic promises of cure.

Empiricism, as the generations grew more intelligent has generally given way to scientific medicine and the civilized world is becoming more and more insistent upon a rational and effective therapeutics.

There still exists, however, many theories for the eradication of the ill to which human flesh is heir, some of which are honestly and some of which are dishonestly practised.

It is not likely that this state of things will ever be entirely changed, until frail human nature is purged of its commercialism, and all men come to believe that, in the long run, honesty is the best policy.

There can be no doubt that some few men have been led to honestly embrace a single dogma and to practice it conscientiously in these latter days, and there is also no doubt that the one principle of treatment may have produced excellent results when applied to that one class of ailments, in which it was applicable, but the temptation has been, when

faith was aroused and confidence secured, to promise more benefits in a variety of directions than could be realized. Some previously honest men allowed their commercial tendency to lead them into dishonestly promising more than they could perform.

Illustrations of this statement will probably occur to the minds of those present, and only one or two need be mentioned familiar to everyone.

For example, the good results of water, cold and hot, inside and outside the human body are recognized and acknowledged by us all, in appropriate cases, and when employed in association with other remedies is productive of the best of results. But when a cure is promised by individuals, or water-cure institutions for all, or inappropriate cases, the spirit of commercialism has outstripped the spirit of honesty.

The same is true of electricity, also of diet, of exercise, especially the exercise of faith, that beautiful and saintly virtue, when exercised in things spiritual, but when blindly exercised in the belief of things too material and commercial is prostituted to the extent of leading some of their innocent victims into the jaws of death, and through the gates of that bourne from which no traveller returns.

General and special massage has been in more or less use for the relief of the pains and the sprains of the human race since the time when the Great Physician cured disease by the laying on of hands.

That it benefits many abnormal conditions, and cures some, we all admit, but that it cures or even benefits all abnormal conditions, all honest men deny. That it does much harm when applied in inappropriate cases is an accepted fact by all intelligent and honest men.

The various methods of applying massage have the same objects in view, whether it be manual, vibratory, or electrical. The same may be said when employed generally, specially, or locally. In all cases, this agency for good, if only good

results are to be expected, should be employed only after a careful and expert diagnosis has been made of the exact nature and stage of the disease or injury to be so treated.

To massage an acute sprain or fracture is just as much an error as to massage an acute inflammation or abscess, while great good is accomplished in the improvement of the circulation, in promoting absorption, in soothing pain, in allaying nervous irritation and relieving insomnia in the chronic stages of these and many other properly diagnosed conditions.

Harm has been done by too early, too constant, and too frequently repeated massage, by too zealous, ignorant, and irresponsible persons calling themselves masseurs, and thus imposing a spurious article upon a too credulous and confiding public.

Institutions, as well as individuals, devoting their energies to this one method of treatment, or occasionally combining baths or electricity with it, are likely to do much harm unless they combine the rare virtue of the expert diagnostician with their manipulative skill in the use of those methods of treatment.

The question of "pelvic massage" was brought prominently before the public by Major Thure Brandt, of Stockholm, an officer in the Swedish Army, about twenty-five years ago. Major Brandt was an instructor in health gymnastics in that city, and from the preservation of the health of the Swedish officers he gradually developed a system of Swedish movements and hygienic gymnastics for the cure of disease among the officers suffering from torpid liver, constipation, and hemorrhoids, and finally extending his practice to the female sex.

To abdominal massage and his system of hygienic gymnastics for the above-mentioned ailments in both sexes he also added and developed a system of pelvic massage for the cure of many of the diseases and misplacements of the female pelvic organs.

So great was his success in the treatment of these conditions that his method attracted much attention, and he had many pupils from different parts of Scandinavia and Germany and some from France. He, and later on his followers, claimed to be able to cure permanently many of the chronic pelvic inflammations by abdomino-pelvic massage, especially those accompanied by exudates and adhesions, forcing the uterus and its appendages into mal-positions. The two hands working together, sometimes in unison and sometimes opposing each other, it was claimed would gradually and painlessly, after many seances of from ten minutes to half an hour each, succeed in attenuating adhesion down to the disappearing point, in causing the absorption of effusions of greater or less density, finally liberating the uterus from its abnormal environment and the tubes and ovaries from their beds of adhesions.

The attractiveness of these claims brought many timid women with pelvic diseases to those who practised this method of treatment, and much was made of the successes which followed. It was called the "bloodless method," and was placed directly and prominently in contrast with the technique and occasional bad results of pelvic surgery.

The point was constantly made that a surgical cure was frequently at the sacrifice of important organs, and even when the patient's life was threatened by the presence of abscesses or tumors, and saved by their successful removal, painful or disagreeable sequelæ, which sometimes followed, had finally to be removed by pelvic massage.

In the translator's preface of Dr. Zeigenspeck's book on *Pelvic Massage* the following is his opening sentence:

"The medical world of to-day becomes more and more fully convinced of the fact that pelvic massage is to be classed among the most important therapeutic measures in gynecology, especially on account of the disappointment so frequently met with in the operative proceedings."

Zeigenspeck says on page 12 of his book, after referring

to the failure of many chieftains in medical science to recommend Brandt's treatment, "that many of the lesser lights are using it with great success, and he constantly recommends it to his classes in the University. And after using it in over 1000 cases with the greatest success, his conscience would revolt, were he to fail to recommend pelvic massage, in even a single instance, in which he had employed it in the past, as no method cured so quickly, and none had so few relapses."

He says of local treatment that it consists, with few exceptions, in massage and stretching. He leaves out many of Brandt's hygienic gymnastics, and even changes the position of patient and manipulator from that illustrated in Brandt's book. "Massage serves to promote absorption of swellings and effusions and to relieve painful and swollen organs. Stretching is used in inflammatory processes where shrinking has set in, to lessen the adhesions which have formed in the pelvic connective tisue and to separate organs which have become adherent to each other by peritonitic exudations." "With the fingers of one hand in the vagina we stretch the fixating cord, while with the other hand the band is massaged from the abdominal wall."

Gilliam, on page 358 of his text-book on *Gynecology*, in discussing the treatment best calculated to promote the absorption of exudate and restore the pelvic circulation to its normal equilibrium, recommends pelvic massage as of undoubted efficiency in promoting absorption and liberating adhesions, but he says, before this is resorted to, the presence of pus in the pelvis should be accurately determined lest serious damage ensue.

Garrigues says on page 199 of his *Gynecology*, certain manipulations inside of the pelvis and through the abdominal walls constitute a valuable mode of treatment in many diseases of women, especially chronic metritis, cellulitis, peritonitic exudations, hæmatoma, oophoritis, etc.

In this way exudations, infiltrations, hypertrophies, and adhesions are made to disappear, weak ligaments and mus-

cles strengthened, and displaced organs brought back and kept in their normal positions. He thinks the procedures are so painful that there is no danger of causing sexual excitement.

He recommends against its use if there is blood or pus in the tubes. Again on page 473, while discussing the treatment of bound-down retrodisplacements after condemning Schultz's method, of forcibly breaking up adhesions, usually under the influence of an anæsthetic, he says of massage (Brandt's method) not less efficacious and safer than Schultz in Brandt's method, that obtains similar results by means of manipulations directed through the abdominal wall and the vagina. By this method the adhesions are stretched gradually and made to be absorbed by increase in vital processes. If, however, there is a pyosalpinx or other purulent collection in the pelvis the pus may be pressed into the peritoneal cavity and cause acute inflammation that may end fatally.

Penrose thinks the results of pelvic massage in the treatment of chronic pelvic inflammation have not been very encouraging. Reed and Baldy are practically of the same opinion.

Coe devotes thirteen pages of his book on *Clinical Gynecology* (184 to 197) to a description of the uses and abuses of pelvic massage.

He highly approves of its use in the chronic stages of pelvic exudations, such as Brandt and Zeigenspect described as parametritis and perimetritis chronica, and of the pelvic swellings and adhesions which bind or mat the pelvic organs together. He opposes its employment in all acute inflammations, infections, and in pus collections.

Where the masseur possesses sufficient expert skill to make the necessary differential diagnosis he even goes so far as to recommend such pressing and stroking manipulations as will empty sterile fluid collections of the Fallopian tubes into the uterus.

Coe says that pelvic massage when well carried out is

really one of the best means at our command for the treatment of uterine displacements caused by adhesions.

Especially is this true of bound-down retroversions and retroflections. He thinks pelvic massage useful in amenorrhœa and dysmenorrhœa where these conditions are dependent on faulty circulation, or upon obstructed venous circulation caused by displacements or effusions, or exudations pressing upon the pelvic vascular supply.

Dudley devotes an entire chapter to pelvic massage in his recent work on *Practical Gynecology*, introducing many of Brandt's descriptions and illustrations. He says that pelvic massage for chronic inflammation around the uterus as developed by Thure Brandt is one of the most effective of the non-operative local measures, and is indicated for the removal of inflammatory exudates, the stretching and breaking up of adhesions, the restoration of function to contracted or overstretched ligaments, and reposition of the displaced organs. Dudley recommends that a masseuse be employed, as he says, for obvious reasons.

He also, as all the other authors I have quoted, speaks of massage only as one of the methods of non-operative treatment, and while he thinks very highly of it in appropriate cases, recommends surgical procedures for the relief of acute infections, malignant, ectopic, and pus cases.

Montgomery's reasoning is the same as the others. Under the head of "Local Therapeutics in Gynecology," he says, page 109, of the Brandt system, "this procedure will be indicated in all subacute and chronic inflammations of the pelvic organs unassociated with pus formations in displacements when fixed by inflammatory adhesions, in subinvolution and hypertrophy of the uterus, from chronic interstitial inflammation and in relaxation of the pelvic floor from increased weight of pelvic organs."

In describing the treatment of uterine displacement, he says, among other things, "with purulent inflammation or pus collections in the tube excluded, the absorption and loosening

of the adhesions of the ovary and uterus can be effected by pelvic massage."

My own experience in the use of this method has been mostly in the non-operative treatment of uterine displacements, and by non-operative is meant those cases presenting uncomfortable and disagreeable symptoms, and yet not sufficiently distressing to suggest surgical operations. So far as my experience has gone mere displacements themselves have given very little trouble. The natural position of the uterus in the pelvis being one of entire mobility, the symptoms complained of are caused mostly by coexisting complications.

These complicating conditions were caused by the effusions, exudations, adhesions, and chronic inflammations mentioned by the authors above quoted. When yielding to the importunities of patients to try some non-surgical treatment, I suggested pelvic massage, partly to gain time, and, in some cases, to demonstrate the uselessness of any but surgical methods. After a few weeks of treatment the surprise of the physician was greater than that of the patient when the complicating conditions disappeared, and with them went the symptoms also. All cases cannot be thus treated successfully.

As above frequently stated acute inflammations, infections, the presence of pus, malignant and ectopic pregnancy, contraindicate pelvic massage, but we do not have many distressing retrodisplacements accompanied by any of the above mentioned associated contraindications, but complicated still by those other associated conditions which are not included among the contraindications.

In those cases where one possesses the expert skill to differentiate the safe from the unsafe conditions, pelvic massage can be relied upon to restore abnormal status to normal when intelligently and honestly carried out by one fully understanding its details.

This method of treating uterine displacement has seemed especially applicable on account of our failure to definitely

agree upon any surgical procedure which has found anything like universal acceptance.

Our surgical brethren actually rival Heinz with his fifty-seven varieties of pickles, as more than that number of operations and modifications of operations have been proposed and practised for the surgical relief of retrodisplacements of the uterus. This fact is evidence in itself that none of them are satisfactory to surgeons generally.

In December last, I read a paper on "Ventrosuspension" before the Southern Surgical and Gynecological Association, and tried to convince its Fellows that this operation was applicable to a wider range of cases than any other, notwithstanding its rare but possible interference with pregnancy and labor, ventral hernia in a few cases, and failure to succeed in about 15 per cent. of still other cases.

In the prolonged discussion nearly everyone had a little fault to find with ventrosuspension and finally closed his remarks by recommending some modification which he thought an improvement. Hardly any two, however, agreed upon any particular operation.

I thought then, and still think, this procedure has more to commend it and less to discredit it than any other of the fifty-seven varieties when any surgical operation is required. Every surgeon knows that the same operation has to be differently performed in different cases. Women differ, their conditions differ, and their operations cannot be all the same. One has to fit the punishment to the crime, as they say in "Pinafore."

In the *Journal of the American Medical Association* for May 11th, is a very thoughtful article by Dr. Lucy White of Chicago, in which she attempts to prove that surgery is a dismal failure when attempted for the relief of uterine displacements. The paper fairly bristles with statistics. After a general attack on pelvic surgery for this purpose, she asks three very pointed questions: 1st. "Are these operations (for retrodeviations of the uterus) necessary?

2d. Are they safe surgical procedures? 3d. Have they proved successful in a sufficiently large percentage of cases to warrant their continuance?"

She concludes her paper as follows: "From the statistics cited and the testimony presented by the numerous witnesses quoted in my paper, as well as from the results of my own clinical observations, I feel warranted in answering the questions in the negative. Surgical procedures in retrodeviations are unnecessary, they are unsafe, and have not proved successful in a sufficiently large percentage of cases to warrant their continuance."

Dr. Helen Hughes, of Minnesota, in the February 25th number of the *New York Medical Journal*, writes a paper on this subject, the first paragraph of which is as follows: "The importance of this disorder among the diseases of women is evidenced by the number of methods which have been exploited for its cure, none of which have been so satisfactory as to close the subject."

If all this be so, we may turn in the future to pelvic massage, which Zeigenspect says he has tried in over 1000 cases, and that no method cures so quickly and that none has so few relapses.

From all I have read and from a slight though increasing personal experience I believe there is much of good in pelvic massage, when properly used in properly diagnosed cases. Quite a bright future may yet open up for its expert use in the debatable and yet unconquered field of uterine displacements, but like all other good things it is liable to abuse by the unfortunately unexpert or commercially dishonest practitioner.

A SUCCESSFUL CASE OF TOTAL EXCISION OF THE LARYNX FOR EPITHELIOMA.

By James E. Thompson, M.D.,
Galveston, Texas.

The following interesting case which is reported below was admitted into the John Sealy Hospital on February 24, 1905, under the care of Dr. Henry Haden.

The patient was an English sailor, aged thirty-two years, who gave the following history:

Family History. No history of consumption or cancer.

Habits. Smokes excessively but drinks moderately.

Personal History. No history of syphilis. Says that four years ago last October he had a spell of fever in a hospital in Colon, since which time his voice has been gradually getting worse. About two weeks ago found himself unable to speak above a whisper.

Present Condition. He complains of no pain except during coughing or swallowing. Attacks of coughing, which are fairly frequent, are attended by bloody expectoration. He asserts that hemorrhage was not observed before January of this year. Breathing is very difficult, but prior to January was not troublesome. At times breathing becomes stertorous, particularly after coughing up plugs of mucus which apparently block up the air passage temporarily. The site of the obstruction is pointed out by the patient at the level of the lower end of the thyroid cartilage. The patient has been gradually losing weight for a year and the loss has been marked since January.

Condition on Admission. The patient was a man fully six feet two inches in height and of very powerful build. He showed very slight signs of emaciation. He complained seriously of difficulty in breathing, and suffered from paroxysmal attacks of coughing. Phonation was very imperfect, speaking being reduced to a whisper. The expectoration was mucous in character, but occasionally contained a little blood. *Laryngoscopic examination* showed a growth occupying the left side of the larynx, arising from the mucous membrane on the inner and upper part of the arytenoid cartilage and extending from this along the true vocal cord, and also for a short distance along the arytæno-epiglottidean fold. Apparently it was confined to the left side of the larynx. It was pale pink in color and the edges were irregularly crenated in outline and everted.

Two unsuccessful attempts were made to snare a piece of the growth for microscopic examination.

From the day of admission, February 24th, until March 3d, the patient was treated with mercurial inunction and iodide of potassium. On the latter date breathing became ominously embarrassed and the case was transferred to the surgical service for a tracheotomy. The operation was performed under local anæsthesia. The isthmus of the thyroid extended as high as the cricoid cartilage and it was impossible to drag it down far enough to confine the incision to the trachea. Therefore, the cricoid cartilage was divided. (This as will be seen later was a serious mistake, because the adhesions around the thyroid isthmus caused grave difficulties in the final operation of laryngectomy.)

Great relief followed the tracheotomy, but the patient did not pick up strength fast enough and a radical operation was suggested and accepted.

On March 31st a total bilateral laryngectomy was successfully performed. Neither Hahn's cannula nor Trendelenburg's tampon were employed. Chloroform was administered through the tracheotomy tube. The foot of the table

was raised, and the patient inclined, head downward, at a considerable slant. A vertical incision was carried from the level of the hyoid bone, above, to the sternal notch below, circling around the tracheotomy wound. At its upper end two transverse cuts were carried right and left to the anterior margins of the sternomastoids. The anterior and lateral margins of the thyroid cartilage were denuded with very little difficulty and slight hemorrhage. Below, however, in the neighborhood of the tracheotomy wound, separation of the tissues from the cricoid and upper portion of the trachea was tedious and bloody.

Owing to the preliminary tracheotomy, inflammation had obscured the anatomical landmarks and progress was slow until the isthmus of the thyroid had been divided and the trachea completely separated from it. Next, the upper attachments of the thyroid cartilage were severed and the thyrohyoid space opened up. This was difficult and attended with severe hemorrhage. The patient's breathing was repeatedly interfered with by traction exerted on the larynx and a rapid completion of the operation became imperative.

The thyroid and cricoid cartilages were slit up with scissors along the median line anteriorly, and each half removed as expeditiously as possible. By putting tract on each half in a divergent direction it was possible to keep the tracheal wound patent.

At this stage of the operation the tracheotomy tube was useless and was removed. The position of the patient prevented blood from flowing into the trachea.

The growth was seen to cover the mucous membrane lining the inner surface of the cricoid and showed a tendency to point into the tracheotomy wound. This necessitated the complete removal of the cricoid and as a safeguard the two upper rings of the trachea were removed at the same time. To prevent retraction of the trachea the margin was united to the skin with silkworm-gut sutures.

Very great care was taken to preserve the integrity of the pharynx and œsophagus; and, after removal of the larynx a few catgut stitches were placed in the anterior wall of the œsophagus fixing it to the surrounding tissues in such a way as to form a diaphragm between it and the trachea. All bleeding was stopped and the wound packed with 10 per cent. iodoform gauze.

After the operation the patient was in a very fair condition, but subcutaneous transfusion was deemed advisable. The same evening his condition was excellent.

The following day the gauze was removed and the wound swabbed out every two hours with small pledgets of iodoform gauze. The patient was kept in a sitting posture, and over the tracheal opening a piece of sterile gauze moistened with hot sterile normal salt solution was applied continuously. This was changed every few minutes during the first twenty-four hours; afterward every few hours.

To the care in mopping up the discharges and not allowing them to flow into the trachea I ascribe the marvellous convalescence. The pulse rate was never materially affected. During the first two days it was in the nineties; after this in the eighties. The temperature reached 101° in the afternoon of the day following the operation. It fell immediately. It rose once more on the afternoon of April 3d (third day), fell immediately and afterward remained normal. There was never any lung irritation.

Rectal feeding, exclusively, was instituted and kept up until April 5th, when a tube was passed from the mouth into the œsophagus and two raw eggs beaten in milk were swallowed.

After this date convalescence was uninterrupted. A tracheotomy tube was inserted and worn for some time, as there seemed to be a great tendency to contraction of the opening.

The improvement in the patient's general condition was marvellous. On April 23d, he weighed 136 pounds, on May 1st, 141 pounds; on May 13th, 152 pounds; on May

20th, 153 pounds; on June 6th, 169 pounds. He was discharged on June 22d.

Since that time I have received a letter from his father, dated November 17th, in which he says that his son is in robust health.

Pathological Report. The specimen consisted of the whole larynx, containing all of the thyroid and cricoid cartilages and the upper two rings of the trachea. The larynx is divided into two halves. The outer surfaces of the cartilages are clearly dissected.

The growth is mainly confined to the left side of the larynx; but it can be traced forward over the commissure to the anterior end of the right vocal cord, fully one-eighth of an inch of which is attacked. The growth is macroscopically a typical epithelioma with irregularly crenated and everted edges. It apparently completely fills the box of the larynx.

It appears as a fungating mass with the following boundaries:

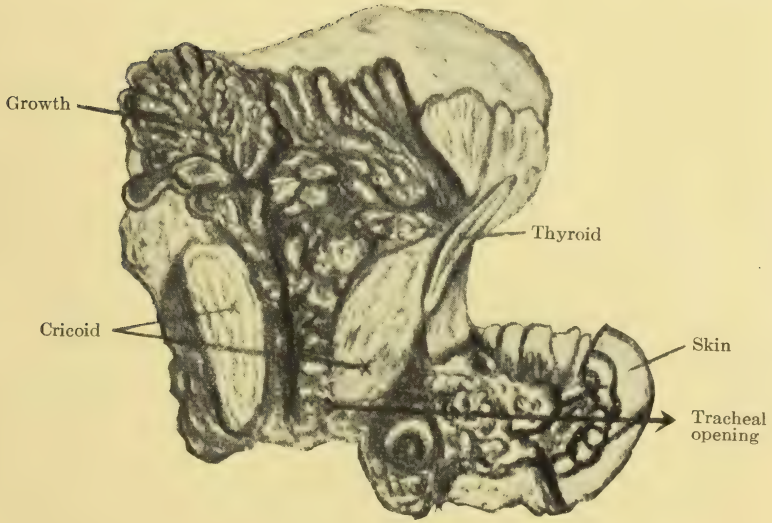
It arises from every part of the inner surface of the left side of the larynx including arytenoid cartilages, and the posterior part of the arytæno-epiglottidean fold. In front it passes from the left vocal cord over to the right. Behind it does not cross the middle line over the cricoid cartilage. The track of the tracheotomy tube is completely lined by malignant growth. (See Fig. 1.)

Microscopically it has all the appearance of a squamous epithelioma.

Epithelioma of the larynx is by no means an uncommon disorder. The most common cause seems to be chronic irritation, and in producing this *tobacco* and *syphilis* seem to play the most important part. *Heredity* does not seem to have much influence; thus Semon only noted it in 3 out of 56 cases.

As to *age*, although not a rare affection between thirty and forty, it is more common between the ages of forty and seventy.

FIG. 1.



One of the most remarkable cases reported by Rehn occurred in a boy three years of age.

As to *sex*, males are much more liable than females in about the proportion of four to one.

The pathological anatomy has many points of interest, a few of which we may consider.

It was Krishaber who suggested the terms "intrinsic" and "extrinsic" as applied to the origin of cancer of the larynx. By intrinsic he meant the following varieties:

1. Cancer affecting the superior or false vocal cord.
2. Cancer affecting the ventricles.
3. Cancer affecting the true vocal cords.
4. Cancer affecting the parts immediately below the true cords; the subglottic region.

In extrinsic he includes the following:

1. Cancer of the epiglottis (very frequently).
2. Cancer of the aryepiglottic folds (less frequent).
3. Cancer of the arytenoid region (rare).

The significance of this classification is both clinical and pathological.

Intrinsic cancers remain long localized to the box of the larynx; they spread slowly upward and downward, they rarely perforate the cartilage until far advanced, and do not as a rule cause metastases in the lymphatic glands until they have spread so far as to become extrinsic. (It is impossible to help drawing an analogy between them and sarcomata arising in the antrum of Highmore and in the interior of the epiphyses of the long bones.)

A study of the lymphatics of the larynx explains this peculiarity. The true vocal cords are poorly supplied with lymphatic trunks; but, as one passes upward and downward the tissues show a gradual increase in lymphatics until they become very numerous in the aryepiglottic folds and epiglottis. We know that cancer spreads by the lymphatics and it is argued that the paucity of the trunks accounts for the slow spread of epithelium in this situation.

The true vocal cords are most often the primary seat of the affection and here the lymphatics are most attentuated. We find clinically that cancer arising in this situation has a tendency to remain localized to one side; and when it becomes bilateral it usually extends across the posterior commissure. Further, it prefers to spread upward toward the supraglottic, rather than downward toward the subglottic region. The lymphatic glands are never affected in pure intrinsic cancer, according to Krishaber. Cunéo differs from him and maintains that when cancer attacks the false cords (superior cords) glandular affection is rapid. Clinical evidence, however, is against Cunéo.

The accompanying diagram will explain the lymphatic drainage and the glands likely to be infected. (See Fig. 2.)

The tendency of cancer of the larynx to remain local for a long period forms the basis of the operation performed almost exclusively by Butlin and Semon. They claimed that laryngectomy is not necessary in intrinsic cancers, but that free excision of the growth down to the cartilage will give as good results as far as recurrence is concerned, and better results as regards mortality.

The operation they perform is a "thyrotomy" with free exposure of the interior of the larynx, followed by thorough excision of the cancer. The following is a resumé of the steps of the operation:

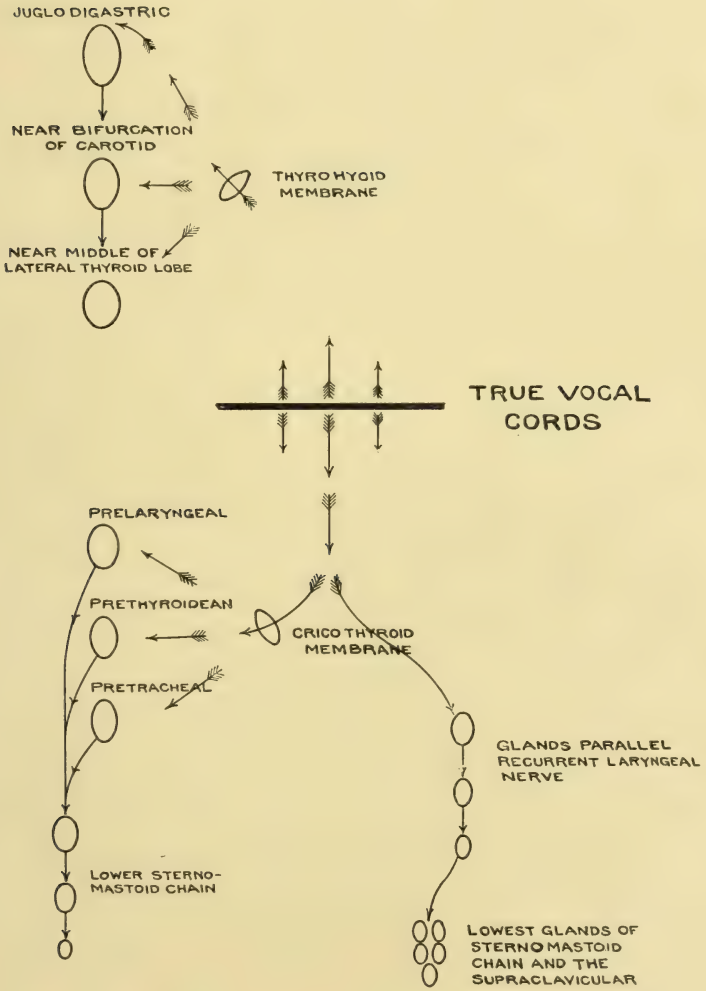
1. The patient is placed on a table with the head, neck, and shoulders raised.

2. The excision extends from the hyoid bone above, along the median line to the sternal notch below.

3. All the soft structures are divided down to the thyroid and cricoid cartilages and trachea, including the isthmus of the thyroid body.

4. A low opening is made into the trachea and Hahn's compressed sponge cannula is inserted. This is allowed to remain in position for ten minutes before proceeding with the further steps of the operation, in order that the sponge

Fig. 2.


JUGLO DIGASTRIC
NEAR BIFURCATION OF CAROTID
THYRO HYOID MEMBRANE
NEAR MIDDLE OF LATERAL THYROID LOBE
TRUE VOCAL CORDS
PRELARYNGEAL
PRETHYROIDEAN
CRICO THYROID MEMBRANE
PRETRACHEAL
GLANDS PARALLEL RECURRENT LARYNGEAL NERVE
LOWER STERNO-MASTOID CHAIN
LOWEST GLANDS OF STERNO MASTOID CHAIN AND THE SUPRACLAVICULAR

may swell up. During this period all bleeding points are tied.

5. The thyroid cartilage is now split up accurately in the middle line anteriorly, and the alæ retracted with silk thread retractors, to enable a good view to be obtained of the interior of the larynx.

6. The growth is now circumscribed by two elliptical incisions carried to the perichondrium. This is made to include half an inch of apparently healthy tissue around the growth. The cartilage is then well scraped with a sharp Volkmann's spoon and bleeding arrested by sponge pressure. Powdered iodoform is then dusted in.

7. The alæ of the thyroid are then sutured and the wound is closed except below where the Hahn cannula was inserted. This is left open in order that the discharges may have free exit. No tube of any kind is retained.

8. One of the great essentials is the care in the after treatment. A piece of iodoform gauze is placed over the wound and is changed repeatedly as it becomes soiled. The patient is placed on his side with the head low, the side operated on being lowermost. This position favors the passage of discharges from the wound.

After-feeding. He allows the patient to try to swallow sterile water four or five hours after the operation. The patient leans over to the side opposite that operated upon and if he swallows successfully he is allowed to take other liquids. If not, rectal feeding is instituted. Convalescence is very rapid, the wound usually being healed in ten days.

To use Semon's own words (*loc. cit.*) he remarks that "if the operation is restricted to cases in which it is really applicable its results are perfectly ideal." But in order to obtain such results the following conditions are absolutely essential:

1. The operation must be restricted to the early stages of intrinsic malignant disease.

2. For this purpose an early diagnosis is indispensable.

3. The operation when performed must be thorough, that is, no sentimental considerations concerning the amount of vocal power to be retained by the patient must interfere with the imperative necessity of removing a sufficient area of healthy tissue around the new-growth in all directions. A violation of this on one single part of the periphery of the new-growth may frustrate the entire purpose of the operation.

4. Should it be found after opening the larynx that the disease is more advanced than it appeared from laryngoscopic examination it is the duty of the operator not to limit his interference to the operation originally contemplated but to perform partial laryngectomy, or indeed any other operation, the necessity of which may become apparent, when the extent and depth of infiltration of the new-growth has been definitely ascertained.

It seems that the whole question hinges on the point of early diagnosis, and in connection Semon early pointed out a very valuable sign in the case of a doubtful growth springing from a vocal cord. If there is an impairment of mobility, *i. e.*, some sluggishness in the movement of the affected cord, it points more to malignancy. He maintains that this symptom will be present from whatever part of the cord the growth springs, but he makes no claim to its presence in every case of early malignant disease or its absence in every non-malignant affection. (De Santi.)

The results are remarkable: out of twenty thyrotomies, only one death resulted from the operation.

As to the ultimate results (after elimination from the twenty cases, two operated upon too recently to be included), out of eighteen cases operated upon, between June 2, 1891, and July 20, 1902, fifteen, that is 85 per cent., were alive and well at the time of writing.

The comparison between these results and those published by Sendziak is astonishing. Writing in 1897, he collected ninety-two cases of thyrotomy with nine deaths, *i. e.*, a mortality of 10 per cent., which he remarks is "ungeheuer klein."

As to freedom from recurrence, out of eighty-five cases, only 18, *i. e.*, 8.5 per cent., were alive at the end of three years.

With these remarkable results of thyrotomy reported by Semon, those following partial and total laryngectomy reported by Themistocles Glück, of Berlin, compare favorably. In truth, they compare more than favorably because they were conducted for extrinsic disease, often far advanced, necessitating at times the removal not of the larynx alone but of parts of the pharynx and infected lymphatic glands.

The following will explain the results of his operations, numbering, all told, eighty-four: hemilaryngectomies, thirty-five cases, three deaths; total laryngectomies, twenty-two cases, one death; partial extirpations of larynx, pharynx, and glands, twenty-seven cases, one death. Total, eighty-four cases with five deaths.

Of these eighty-four patients, thirty-eight were still living, the oldest case having been operated on thirteen years ago. Of those already dead a number lived eleven, eight, six and one-half, five and one-half, four and one-half, and three and one-half years after the operation in good health.

This, compared with the statistics of Sendziak, is very instructive as showing the enormous decrease in the mortality in the last ten years (Sendziak, 1897): partial extirpation, 110 cases, 26.3 per cent. mortality, ten alive after three years; total extirpation, 188 cases, 44.7 per cent. mortality, eleven alive after three years. The cause of this decrease in the hands of Glück can be ascribed to three factors:

1. An unusual degree of skill attained by an extensive experience in these operations.

2. More careful observance of asepsis during the operation

3. The employment of a technique which prevents blood from passing into the air-passages during the operation, and the wound discharges and food from soiling them during the after-treatment. This technique was as follows:

After severing the larynx from the trachea he brought the cut end of the latter through a button-hole incision made in

the skin just above the sternal notch, by which means he effectually interposed a barrier between the wound and the air-passage.

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NEGLECTED APPENDICITIS.

APPENDICITIS WITH ESPECIAL REFERENCE TO DELAYED CONDITIONS.

By Charles M. Rosser, M.D.,
Dallas, Texas.

A pathological process remaining undiscovered through previous generations of inquiry could hardly be clearly understood in one century of investigation, and notwithstanding the very voluminous literature upon the subject, so long as there is disagreement upon any essential point further contributions to the study of diseased condition of the vermiform appendix will not be inappropriate.

The original claim by physicians that the disorder was purely a medical one, and the counter contention of surgeons that the newly found field was entirely operative, continued with indications unfavorable alike to both positions until more rational management and better surgical technique rendered results in each line of effort safer and therefore more popular. In the present light upon the subject it is not strange that purgation promoted the process through peristalsis, that poultices encouraged putrefactive changes, that feeding furnished material for flatulence and that the system of practice was followed by results perhaps not so good as those obtained by unaided nature. We now understand that spontaneous emesis and protracted anorexia are conservative conditions, and that the principle involved in muscular rest is applicable in this feature of inflammation as in others, and the wonder is that the illogical procedures referred to were so long permitted

by practitioners, and more than that even yet they have not been abandoned by a limited few. The only explanation must lie in the character of alternative which the surgical opportunity presented during the same period, but it is highly creditable to the profession at large that material improvement has been made to the extent which it has, and it is undoubtedly in the interest of scientific truth that physicians and surgeons were alike working to the same end, for if the modern methods of asepsis and the present good facilities for operative success had been realized in the beginning the mortality rate would have been better, to such a degree that further study of the medical aspects of the disease would have seemed undesirable. On the other hand, had the plans now employed in medical management been generally in vogue before the condition became so safely surgical there would have appeared but little necessity for perfecting our operative work in this direction. However, in view of the fact that independent of and against professional advice there are patients stubbornly averse to surgical relief, and because situations are encountered wherein its procurement is impossible, it will remain important that a general knowledge of proper medical treatment be widely maintained, and the serious mortality which is known to follow the best medical practice when observed for even a little time emphasizes the advantage which surgical science can justly claim.

The original question "whether to operate" has been settled affirmatively, and was succeeded by that of "when to operate," the last being in some quarters still under discussion.

We now propose a discussion as to who shall operate and what methods and to what extent shall an operation be done.

The profession is pretty well agreed that there is practically no risk in a removal of a normal appendix or one in which the inflammation is subacute, and the class wherein the inflammation is yet limited to the

structure of that viscus. At the same time popular prejudice and personal timidity coupled unfortunately sometimes with indecision on the part of the medical adviser permits cases to pass beyond the safe surgical limit. Such cases may be styled "neglected," and the term is equally applicable whether the delay is due to inability, indifference, or cowardice, and whether the responsibility is upon the physician, the family, or the patient himself, and in the knowledge that there was a time in the history of each fatal case when surgical effort properly applied would have saved the life there can be no comfort to the surgeon in a consciousness which omits any possible duty or the recognition of any personal opportunity. Nevertheless, from the various reasons we are constantly called upon to assume charge of conditions incident to the period between the second and the seventh day of an attack, and it is then that the gravest questions are presented. One of several conditions will be present, but unfortunately we are not always able to determine with absolute accuracy from the clinical symptoms, nor can we know in advance its probable course nor how soon an apparently mild may be changed into the fulminating form. If the pulse and temperature were reliable guides in all instances, if the presence or absence of pain were a controlling symptom at all times our difficulties would not be nearly so great.

In the absence of any possible power to determine the exact pathology and progress in any given case except upon exploration and inspection I incline to the belief that the rule should be an operation in each instance, the extent to which the operation should go, to be determined only after observing the real status relieved of obscurities necessarily present until removed by demonstration.

If the condition is that of receding inflammatory action the practically sure recovery will not be prevented, and an easy removal will entirely obviate the recurrence equally certain in all cases not so treated.

If the appendix is gangrenous and not ruptured the greatest safety lies in the earliest possible excision and the uniformly good results in no way justifies delay in hope of plastic protection and local limitations. A wooden ash bucket containing also live coals may remain overnight without igniting the house, but it is safer to place it in the back alley before going to bed. A burglar may go through the premises and take nothing away, but it is more sensible to have him placed behind the bars as soon as apprehended. In cases gone to perforation and pus production the best judgment as well as skill will be required. In the majority of cases, whether localized or diffused, simple drainage will be the safest plan reserving for another time a secondary operation to complete the cure.

Very much depends upon the character of drains employed, the position in which they are placed and the manner in which the structures are manipulated, and I cannot too strongly emphasize the necessity for intelligent selection and the most delicate precision and procedures.

Irrigation is objectionable because of probable interference with plastic efforts which nature may be making and the possible spread of the infection to other exposed localities.

TWO CASES OF VAGINAL CÆSAREAN SECTION FOR ECLAMPSIA, WITH RECOVERY.

By John F. Moran, M.D.,
Washington, D. C.

The obscurity of the etiology of puerperal eclampsia and the indefinite state of the knowledge of its pathology likewise confront the physician with one of the most perplexing yet intensely interesting problems with which he has to deal.

While the consensus of opinion at the present day attributes its existence to a toxæmia of either maternal, fetal, or combined origin, just when, where, and how it is brought about is not known. It is quite possible that there are different kinds of intoxication of pregnancy, as there are varieties of puerperal infection. (Hubert.) The degree of intoxication can only be determined approximately by a careful study of the symptoms so common in the disease. Albuminuria, œdema, insomnia, amaurosis, dyspnœa, deficient excretion of urea, headache, and epigastric pain are the cardinal danger signals of impending or actual eclampsia, and the persistence of several of these, despite active measures, is a valuable index of the gravity of the disease, and one which calls for the termination of the pregnancy or labor. The life of the mother and child is not only menaced directly by the convulsions and coma but also indirectly by the resultant organic lesions of the liver, kidneys, brain, and heart.

Quite naturally, then, there is a great difference of opinion as to how these cases can be best managed; but elimination,

sedation, and safe delivery are the methods of procedure to be considered. As to the first and second there is general accord, differing only in matter of detail; regarding the third, however, there is decided lack of unanimity. Some advocate treatment solely along medical, dietetic, and hygienic lines, contending that forcible intervention is not justifiable, while others demand that immediate delivery should invariably be undertaken in the interests of both mother and child. There is still another group, who while not agreeing with the conservative policy of the former or the radical methods of the latter as a routine measure, utilize both according to the exigencies of the case. That statistics may be given in favor of either class serves only to prove the merit of each and not necessarily its superiority.

Essential to success is a well-thought-out plan of prompt, definite, but not overzealous treatment, based on the various phases of the disease, combined with knowledge of the condition of the cervix and the changes it must undergo before labor can terminate or be terminated.

In primiparæ, during labor, there is dilatation from above downward with gradual effacement; in multiparæ, on the other hand, until the onset of labor the internal os is usually closed but the external is patulous; as labor progresses the entire canal dilates, and there may be little or no effacement, particularly if dilatation occurs before the presenting part has entered the brim. These characteristic differences should be borne in mind, as they have an important bearing upon the method of procedure.

I am also firmly convinced that the indiscriminate practice of giving anæsthetics, continually or intermittently, extending over a period of some hours, and faulty technique, add to the inherent gravity of the disease and are largely responsible for the high mortality. I formerly believed chloroform to be a sovereign remedy for eclampsia, but experience has markedly changed my views. Given at the onset of the convulsion, when there is a tendency

to asphyxiation, it aggravates the difficulty by interfering with the supply of oxygen. Further, it is a cardiac depressant, and as this organ has already undergone degeneration and the blood contains other toxic material, this together with its deleterious influence on the renal function should restrict its administration to the time when intervention is necessary. Chloroform masks the horror of the picture, but in quieting the symptoms it is apt to add fuel to the flames.

When the cervix is soft and yielding the convulsions are lessening in frequency and severity, the coma not profound, and pains regular. Excellent results can be hoped for from the medical treatment by chloral, morphine, veratrum viride, etc., combined with eliminative measures. In a case of hydramnios or multiple pregnancy, puncture of the membranes will relieve the pressure and may in conjunction with the above remedies suffice. When the cervix is undilated and rigid, or the internal os not effaced, the bougie as advised by Kraus, or the balloon of Champetier de Ribes, the rubber bags of Reynolds or Vorhees, may be used with good effect, provided time is not a necessary element, as impending eclampsia; but on account of the slowness and uncertainty of their action they cannot be relied upon during the convulsions. Likewise, the manual method of Harris or the bimanual of Edgar, and the instrumental, as obtained by the dilator of Bossi or its modification, are not applicable in these cases, unless by skilled hands, and even then there is great danger of extensive lacerations of the cervix and lower segment of the uterus, with possible hemorrhage and subsequent infection. It is in this class of cases that multiple incisions of the cervix, vaginal Cæsarean section, or hysterotomy and the classical Cæsarean section have been advised.

Halbertsma (1878) recommended Cæsarean section for eclampsia, and Hentman has reported thirty-nine cases with a maternal mortality of 51.3 per cent. and a fetal mor-

tality of 43.9 per cent. It is certainly not more favorable than the other methods of intervention for the relief of this complication of pregnancy, and hence has met with little support.

The utility of incisions of the cervix have long been recognized and practised, but attention has been more particularly directed to this operation of vaginal Cæsarean section by Duhrssen, who improved the technique and broadened its indications. . Multiple incisions are of value when the cervix is effaced; when it is not, they are fraught with danger, because of the likelihood of hemorrhage and extension of the incision by tearing, during extraction, on account of insufficient dilatation. It is here that the operation of vaginal Cæsarean section as performed by Acconi (1895) and Duhrssen (1896) is more advantageous, because it provides ample opening of the cervix to admit of immediate extraction.

The technique may be described in the report of the two following cases:

Mrs. S., a primipara; seven months' gestation. Referred to me by Dr. Ball. Admitted to Columbia Hospital, December 2, 1905, 6.30 P.M. At 11 P.M. had had eight convulsions, coma was profound, and cervix was undilated. Upon consultation with Dr. Stone, of the hospital staff, it was decided to perform vaginal Cæsarean section.

The anterior lip of the cervix was seized with a pair of volsellum forceps on each side of the median line, the cervico-vaginal junction of the mucous membrane was incised, as in vaginal hysterectomy, the bladder was separated from the anterior aspect of the uterus by the fingers as far as the reflexion of the peritoneum, and a long narrow retractor was then inserted, lifting up the bladder. An incision extending through the cervix and anterior segment of the uterus, about four and one-half inches, was made with a pair of straight scissors; forceps were applied and the child delivered. The placenta was expressed by Crede's method. The incision

in the uterus was closed with interrupted sutures of kangaroo tendon and the mucous membrane with catgut. The vaginal portion of the cervix was not sutured, in order to permit free drainage. The patient stood the operation very well, but was in a semicomatose state all of next day, probably occasioned by the morphine which had been administered as well as by the toxæmia. She then became violent and had to be restrained by straps. Food was withheld for twenty-four hours, and calomel, $\frac{1}{4}$ grain, was given every fifteen minutes for three hours; nitroglycerin, M. $\frac{1}{100}$, every four hours hypodermically, and high salt solution enemata given in like intervals. About twelve hours after the operation the kidneys acted well, the anasarca gradually disappeared, and the patient recovered completely. The child died of toxæmia thirty hours after delivery.

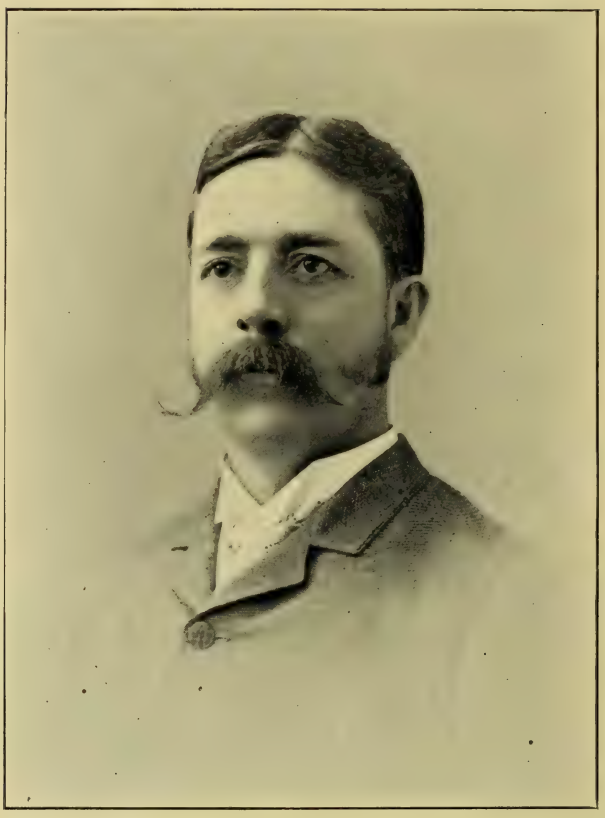
The second case, X., colored; primipara, seven months' gestation. Received into Columbia Hospital, December 25, 1904, 5.30 P.M. She had already had eight convulsions, and as they continued, Dr. Fry, of the visiting staff, was called in consultation at 7.30 P.M. Vaginal Cæsarean section was decided upon and performed at 9 P.M.

The patient by that time had had sixteen convulsions and was in a profound state of coma. It was interesting, in this case, that the pulse at no time exceeded 72, contrary to the generally stated opinion that convulsions do not occur when the pulse rate is this low. The patient was given $\frac{1}{4}$ grain morphine sulphate, hypodermically, on admission, and one-half hour later an additional $\frac{1}{8}$ grain was administered; marked physiological effect followed, the respiration slowing to twelve per minute, and remaining so for several hours after the operation. The incision and procedures were the same as in the first case, delivery being effected with forceps. She was violent for some hours and had one convulsion after the operation. She responded promptly to eliminative measures, recovering consciousness in twenty-four hours, and left the hospital at the end of five weeks, still with a trace

of albumin in her urine. During the operation the bladder was punctured, and after delivery the rent was closed with catgut. There was leakage of urine for several days, then the wound healed and gave no further trouble. The child died of exhaustion about eight hours after delivery.

If the child is large, a posterior median incision should be made. The bleeding from the incision is usually not marked, as traction on the divided ends of the cervix tends to prevent it.

Hemorrhage, extensive lacerations, owing to incomplete dilatation, infection, and rupture of the cicatrices in a subsequent labor are the principal dangers to be apprehended in the cutting operations of the cervix; but with a clean and well-executed technique these complications should rarely occur. All the methods of obstetrical intervention are of value, but each must be used only after thorough examination and study of the case has determined its fitness. An exact knowledge of the condition of the cervix is the essential prerequisite to success. If the cervix is well, dilated forceps or version should be employed, depending upon the position of the head. If it is undilated, the internal os effaced or effacing, manual or instrumental dilatation or multiple incisions will probably suffice; but if the cervical canal is intact vaginal Cæsarean section is indicated. The latter fulfils all the indications of accouchement forcé, and has the additional advantage of not being restricted by the limitations of the other methods; therefore, in an elective case it should give the best result. It is a most efficient operation and a worthy addition to the obstetrical armamentarium.



Palmer Dudley

IN MEMORIAM.

AUGUSTUS PALMER DUDLEY, M.D.

Dr. Augustus Palmer Dudley was born in Phippsburg Maine, on July 4, 1853, and died in Liverpool on July 17, 1905. On the paternal side he traced his ancestry back to George, the first of the family, who went from England to the North of Ireland and settled in the town of Tipperary at a place called Mount Dudley. This was the origin of the family name carefully established after thorough genealogical researches made in the summer of 1891 by Dr. Dudley himself. One of the descendants of George—a Michael Dudley, Dr. Dudley's great-grandfather—came to America in 1775 and settled in Georgetown, Maine, then a part of Massachusetts.

Dr. Dudley was able to trace his maternal lineage back to the tenth century, to the Perays of the North of England and to the Wymans of Wales. Both his paternal grandfather and his maternal great-grandfather served in the war of the Revolution. The war of 1812 similarly enlisted the services of his male progenitors—both grandfathers—and his father, Palmer Dudley, was interested in the military affairs of his State. Six children were born to his parents, Palmer Dudley and Frances Jane Wyman, of whom three are still living.

Dr. Dudley received his preparatory education at the public schools and at the Portland (Maine) Academy. Later he entered the Medical Department of Bowdoin College, and was graduated from Dartmouth Medical School in 1877. After a brief period of practice in Portland, Maine, he removed to New York in 1881, and served during eighteen months, under the pioneers in gynecology, as house-surgeon to the Woman's Hospital. He then took charge of the Woman's Hospital in San Francisco, but returned shortly afterward, in 1884, to New York to resume his practice.

From the outset of his career Dr. Dudley held leading appointments in different institutions. At the University of Vermont he was made, when a comparatively young man, Professor of Diseases of Women, and a few years later he received a similar appointment at Dartmouth Medical College. About this time he was made Surgeon to the Harlem Hospital, an appointment which called forth his talents as a general surgeon and which he held up to the time of his death.

In 1887 he was appointed Visiting Gynecologist to the Randall's Island Hospital and Attending Gynecologist to the Northeastern Dispensary.

In May, 1893, after serving for some time at the New York Post-graduate School and Hospital in the capacity of Instructor in Diseases of Women a vacancy was created through the death of Prof. Charles Carroll Lee, and Dr. Dudley was promoted to a full professorship—a position which he held in this institution up to the time of his death.

In July, 1884, Dr. Dudley married Susie Stephens, daughter of Jesse Mason, of Victoria, British Columbia, who died in July, 1888, without issue. In 1891 he married his present widow, Cassandra Coon, a daughter of W. J. Adams, of San Francisco, California.

During the twenty years of his main activities in the field of gynecology and abdominal surgery Dr. Dudley was a prolific writer. No less than twenty-seven important papers are distributed through the medical literature and many other less important ones. Among the former we mention a few: "A Hasty Ramble Over the History of Gynecology and Obstetrics up to Date," "Umbilical Hernia in the Female," "Impressions Respecting the Practice of Gynecology Abroad," "A New Operation for Restoration of the Lacerated Perineum," "Dudley's Improved Modification of the Saenger-Cæsarean Section," "A New Operation for the Relief of Severe Cases of Rectovaginal Fistula," "A New Method of Surgical Treatment for Certain Forms of Retrodisplacement of the Uterus with Adhesions," Results of Ovarian Surgery," "Intrauterine Implantation of the Ovary," "A Further Report upon Conservative Surgery of the Uterine Appendages," "The Influence of Ovarian Implantation upon Menstruation in Women."

Dr. Dudley was a Fellow of the New York Academy of Medi-

cine, of the New York Obstetrical Society, of the American Gynecological Society, and a member of many others. He was a delegate to congresses of medical bodies in different parts of the world. Besides the different meetings of physicians and surgeons in our country he was to be seen at medical gatherings in Russia, Germany, France, Spain, and England. He was always in the foreground among the speakers, and seldom was his voice silent if anything was left unsaid pro or con.

As an operator Dr. Dudley was known exclusively as a gynecologist or abdominal surgeon. With every opportunity to enter the ranks and compete with the leading general surgeons of his day, with at least one appointment as general surgeon to a large municipal hospital, he always felt that gynecological surgery, like ophthalmic or orthopedic surgery, was a special field in itself and entitled to receive all the concentrated talents and energies of the single individual who was determined on mastering the problems of diagnosis and perfected surgical technique in the domain of the diseases of women. With appointments as visiting surgeon to two large hospitals and professor of gynecology at two colleges, he found time to look after his private operative work in a specially fitted ward in rooms in his own home and to continually haunt the different medical societies of New York. How he found time to keep abreast of the times in his reading and to prepare several important papers each year it is difficult to tell.

Dr. Dudley possessed a charming personality. Of a soldierly bearing—the heritage of a military ancestry—his eyes beamed with intelligence and his mouth always bore a pleasant smile. The beauty of his clear features and manly countenance was enhanced in recent years by his well-groomed white hair and moustache. A double furrow between the eyebrows was the only manifestation of the seriousness of the inner man. In the operating-room he spoke little, but worked quickly, decisively, and brilliantly. The students loved to watch him as with several quick movements of the knife a child was rapidly extracted from the abdominal cavity during a Cæsarean section, or a large ovarian cyst was ligated, exsected, and thrown into the basin within a few minutes. There seemed to be no effort in the rapidity with which the work was done. Everything seemed to move naturally, gracefully, and quickly.

As a talker, Dr. Dudley was always interesting. His voice was under perfect control and rather softly modulated. He usually captured his audience in his first sentences. His language was fluent and there never seemed to be a break for a word or a thought. Naturally aggressive and despotic he clothed his ideas in such well-selected language and charming demeanor during delivery that none could find fault with his opposition or his views.

Dr. Dudley must be ranked as one of America's foremost gynecologists in spite of the fact that during the last year or two of his life those nearest to him recognized the beginning inroads of the malady which finally bore him away. His work in developing abdominal surgery, his incessant efforts to curtail the work of the general surgeons in the direction of sacrificial surgery of the appendages, his discovery of new methods of operating for lacerated perineum, backward displacement of the uterus, and of doing conservative surgery of the adnexa, with implantation of the ovaries to preserve menstruation, will survive him into the future long after the personality of the man Dudley has passed into oblivion.

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